

ASCENT OF MONT BLANC IN A SINGLE DAY.

TO THE EDITOR OF THE TIMES.

Sir,—It has hitherto been customary for persons making the ascent of Mont Blanc to devote two days to the expedition, the first night being passed either in the cabin on the Grands Mulets, or the still more wretched hut on the Aiguille du Gouté. This course necessitates a very large supply of provisions and the engagement of porters at a considerable expense, to carry them up to whichever night quarters may be selected. I therefore venture to trouble you with a few notes of an ascent made on Saturday, the 2d inst., when I had the pleasure of proving the practicability of accomplishing the whole distance in a single day, thereby avoiding the uncomfortable night quarters, materially reducing the charge for provisions, and entirely obviating the necessity for porters.

Accompanied only by my guide, Christian Almer, I left the rough but clean little inn known as the Pavillion Bellevue, above the Col de Voza, at 2 a.m., reached the top of the Aiguille du Gouté at 10 10 a.m., and the summit of Mont Blanc *via* the Bosse du Dromadaire, at 3 5 p.m. The descent to Chamouni was effected by the ordinary route of the Corridor, Grand Plateau, and Glacier des Boissons. By 9 30 p.m. we were within half an hour of the village of Chamouni, but in the darkness missed the way through the lower part of the forest, and although, as we subsequently saw, the track was close to us, were unable to extricate ourselves till daylight. But for this unfortunate *contretemps* Chamouni would have been reached by 10 p.m. The excessive time occupied by the expedition (20 hours, including halts to the extent of only 1½ hour) was caused by the unusually dangerous condition of the Aiguille du Gouté, the ascent of which took two hours longer than usual in consequence of the rocks being coated with ice. Under ordinary circumstances a pedestrian in good condition might fairly hope to accomplish the entire "course" in 18 hours.

I may mention that my provisions for the day, including three bottles of wine, cost the sum of 8½*fr.*, and that, although the mountain had not been before ascended this year, Almer had no difficulty in leading me up and down unaided.

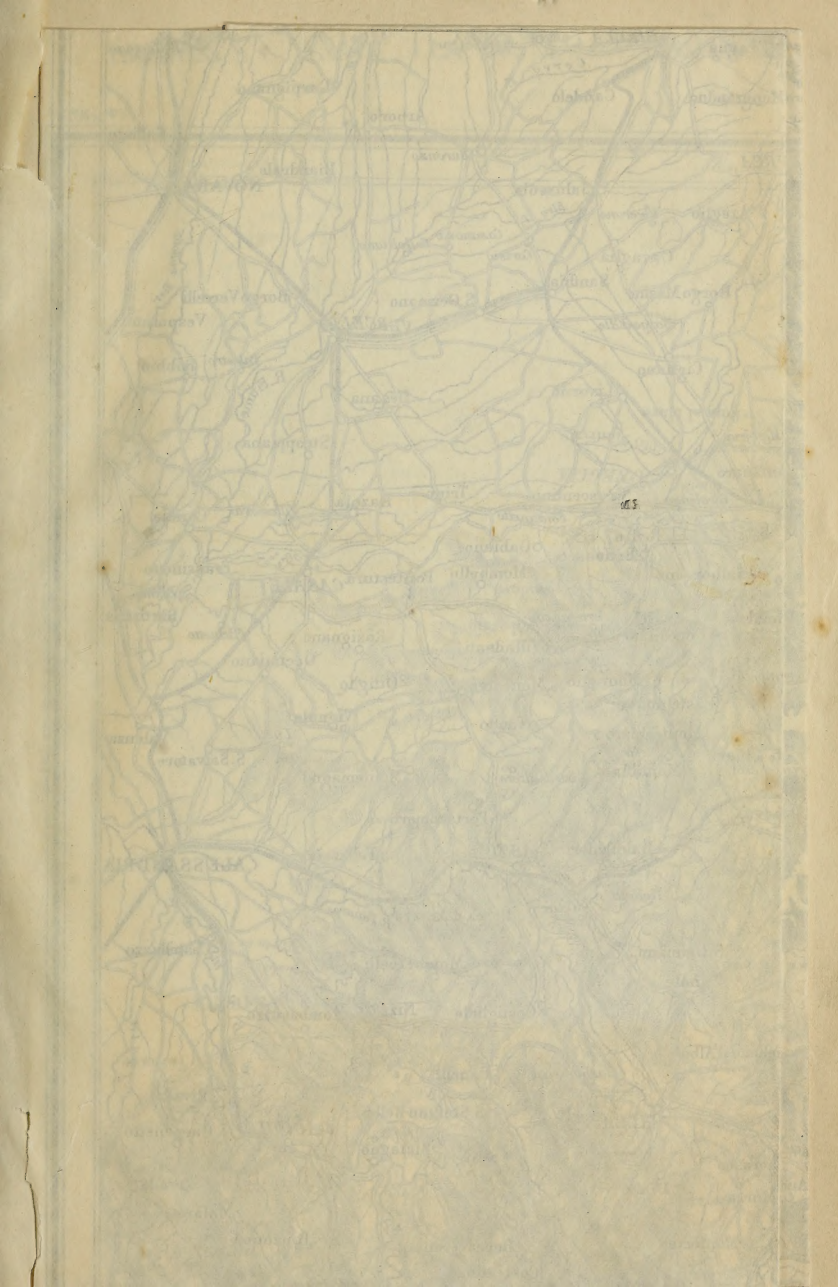
I am, Sir, your obedient servant,

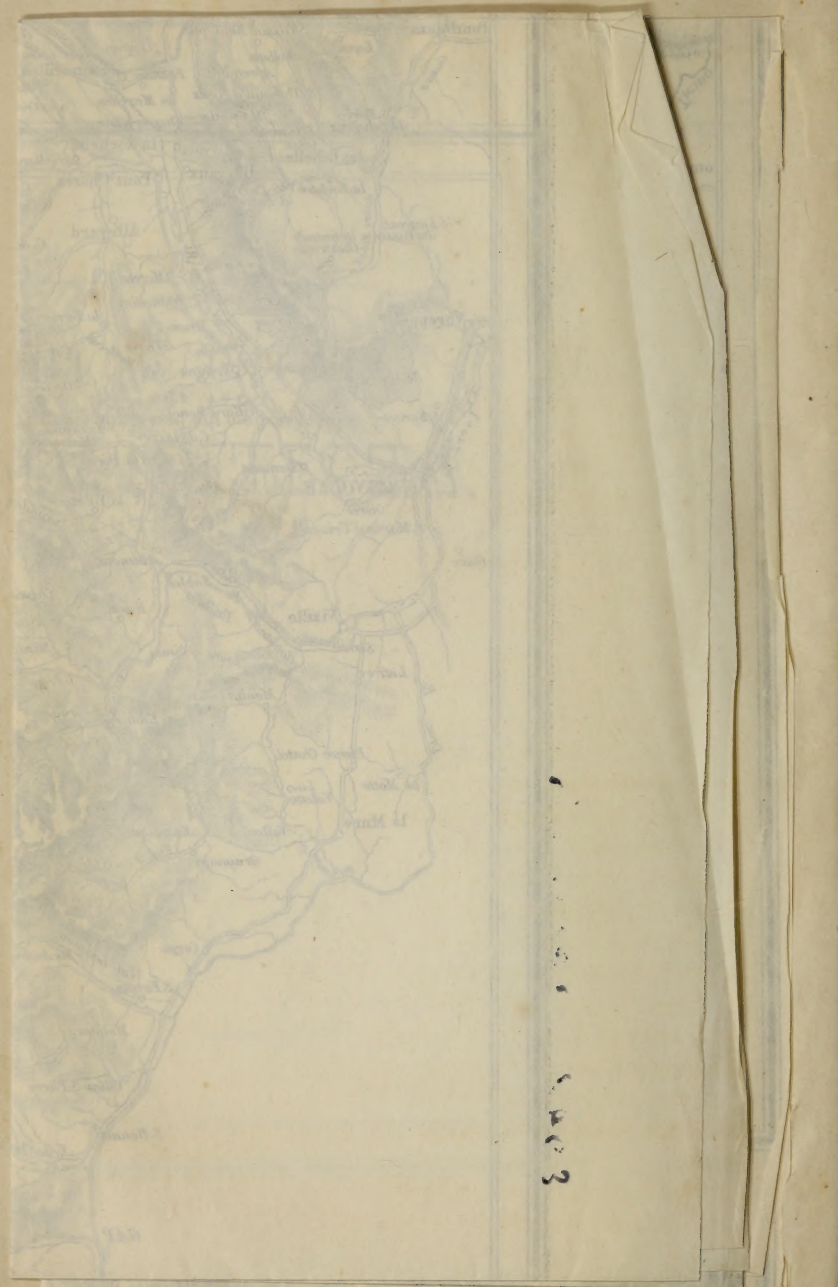
Chamouni, July 4.

A. W. MOORE.

1864

INFORMATION respecting the Western Alps, for use in a future edition, and contributions to the two remaining parts of this work, the Central Alps and the Eastern Alps, will be thankfully received by the Editor. It is requested that they may be authenticated by the name and address of the writer, and directed to care of Messrs. LONGMAN & Co., 39 Paternoster Row, London, E.C.



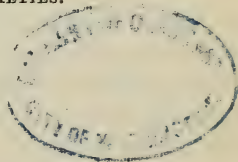


A GUIDE
TO
THE WESTERN ALPS.

BY
JOHN BALL, M.R.I.A., F.L.S., &c.

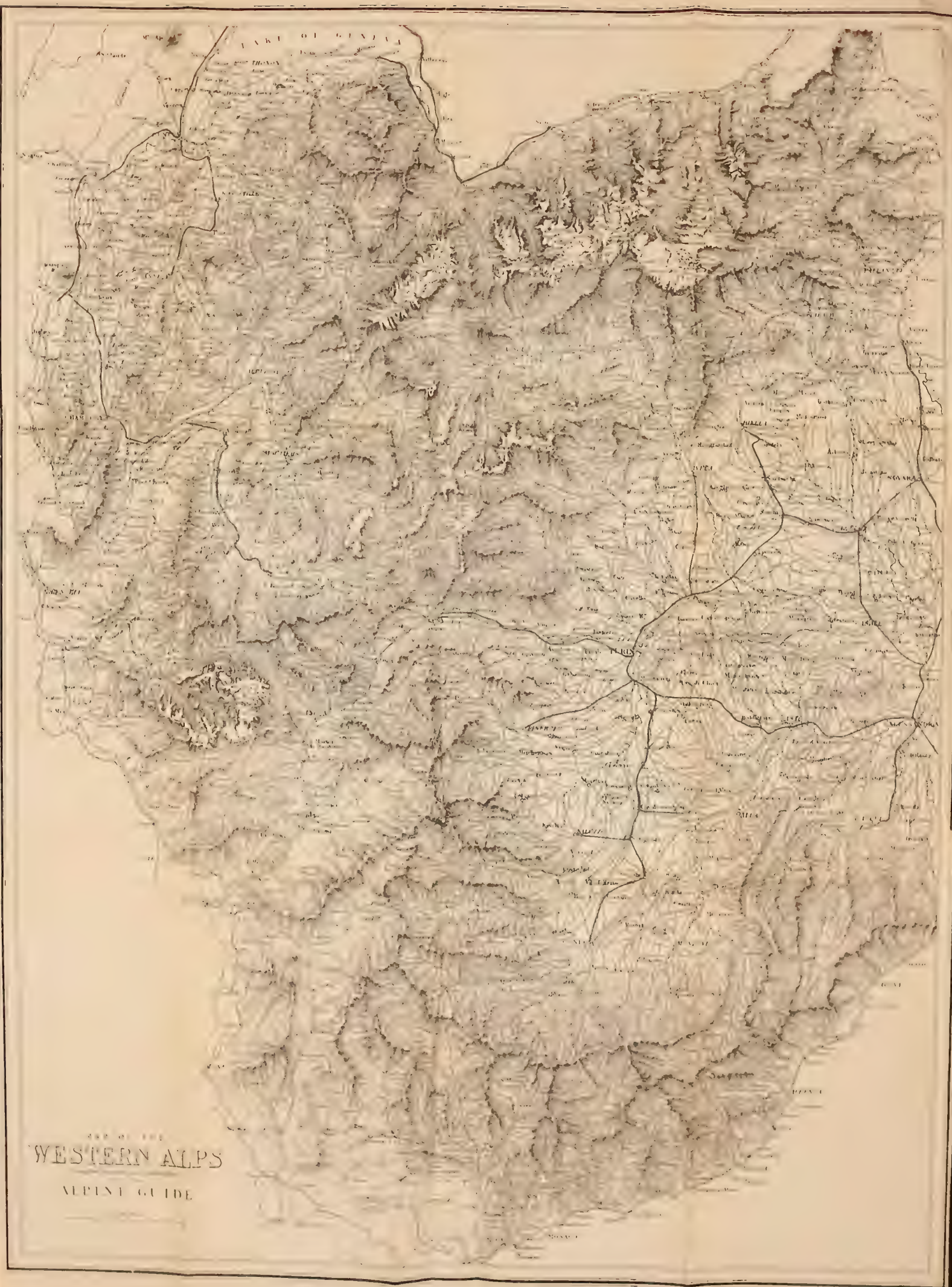
LATE PRESIDENT OF THE ALPINE CLUB.

WITH AN ARTICLE ON THE
GEOLOGY OF THE ALPS, BY M. E. DESOR, OF NEUCHÂTEL, MEMBER OF
VARIOUS LEARNED SOCIETIES.



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ALPINE GUIDE

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P R E F A C E.

A JUST distinction has been drawn between travellers who visit foreign countries with the object of gaining and communicating knowledge, and tourists who go from place to place seeking amusement and change of scene, but without any more definite scope than to gratify a superficial curiosity. The line of distinction between these two classes, which was easily drawn twenty or thirty years ago, is now-a-days less definitely marked. The all but universal taste for travelling has spread at a time when increased knowledge and a more lively interest in physical science have become diffused throughout the educated classes in our own and other countries. Most men of cultivated minds occasionally seek relaxation in travelling, and a large proportion of tourists have sufficient knowledge to take an intelligent interest in some, or it may be in several, departments of science or art naturally connected with the country through which they pass.

These remarks especially apply to travellers in the Alps. The day is past when it could be thought necessary to apologise for or explain the prevalence of a love for mountain travelling. It is a simple fact that, especially in our own country, thousands of persons have learned to regard this as a sovereign medicine for mind and body, and to feel that the weeks or months devoted to it are the periods of life most full of true enjoyment, and those that leave the most abiding impressions. The fact that the scenery of the Alps is unsurpassed elsewhere in the world for the union of grandeur, beauty, and variety, and that it is accessible with a trifling expenditure of time and money, naturally accounts for the constantly increasing influx of strangers.

As high mountain countries, and the Alps in particular, abound with phenomena new and striking to the intelligent observer, there is a constant increase in the number of those who, without undertaking systematic research, are led to desire further information respecting the structure of the earth's surface, and the causes that have uplifted the mountain ranges, or the laws that regulate the circulation of heat and moisture, which maintain what may be called the inanimate life of our planet, or the animal and vegetable forms that exhibit in apparently inhospitable regions so rich a variety.

In addition to these objects of interest, there is a simpler branch of enquiry which especially recommends itself to many of our active and energetic countrymen. Many parts of the Alps are very difficult of access, and but a few years ago there were many considerable districts whose highest peaks had never been attained, which were not known to be traversed by practicable passes, and of which none but slight and imperfect information was anywhere accessible. To explore these little-known districts, to scale the higher summits, and to discover passes that should connect valleys that are separated by lofty ranges, have been the pursuits of the members of the Alpine Club.

Without exaggerating the importance of the work achieved, it is impossible to deny that a remarkable degree of enterprise and energy has been exhibited by many of the members of that association in accomplishing work which, if not actually scientific, is certainly conducive to the progress of science. They cannot indeed rival the men who, following the illustrious example of Saussure, have explored the Alps with the definite object of enlarging the bounds of science; but, in achieving the preparatory task of opening the way through many of the least accessible parts of the Alpine chain, they have undoubtedly surpassed the performances of all their predecessors. Some useful contributions to the hypsometry of the Alps, and other occasional observations, are probably but the prelude to more considerable performances in the field of science.

It has for some time been felt that the time had come for attempting to supply to Alpine travellers a guide-book differing in many respects from those hitherto in use, and the writer has been urged, by some of those most capable of contributing to such a work, to undertake the task. He has no claim to a brilliant share in the adventurous performances of his friends and fellow-members of the Alpine Club; his qualifications, such as they are, arise rather from a somewhat prolonged and extensive acquaintance with the greater portion of the Alps, in the course of which he has crossed the main chain forty-eight times by thirty-two different passes, besides traversing nearly one hundred of the lateral passes.

This work differs from most, if not all, of its predecessors in its plan, which is designed to include the entire region of the Alps. In regard to certain districts the available information is incomplete, but the arrangement is such, that the omissions may be easily supplied hereafter. Besides the preliminary matter contained in the Introduction, a variety of notes and indications connected with geology and botany are scattered through the body of the work, with a view to direct and guide those who feel an interest in those subjects. Detailed notices of the vegetation would occupy too much space, and the botanical indications have for the most part been confined to pointing out localities for the rarest species, chiefly from the writer's personal observation. The article in the Introduction on the Geology of the Alps, which, it is believed, will interest a numerous class of readers, is from the pen of M. Desor, the distinguished Swiss geologist. In translating this essay, the writer has sought to render faithfully the views of M. Desor, which in the main coincide with those of M. Studer and other leading Swiss geologists; but he may be permitted here to say, that on not a few points of theory his own opinions are not in accordance with those of the author. What is certain is, that an extensive field for investigation still remains for future enquiry, and it may be hoped that an essay which for the first time brings together in a connected way the results of past work, will tend to progress, by directing attention to the points still requiring examination.

The portion of the work now given to the public includes, under the title 'Western Alps,' the entire range that encircles the plain of Piedmont, from the Maritime Alps north of Nice to the Pass of the Simplon, along with the Dauphiné and Savoy Alps, and the portions of Switzerland connected with the Pennine range. This is the portion of the Alps in which the amount of new matter available through the activity of the members of the Alpine Club is most considerable, mainly because it includes the portions most difficult of access, and where, owing to the comparative neglect of their predecessors, most remained to be done. The Bernese Alps, and those of Eastern Switzerland, have been pretty well explored by Swiss *savans* and mountaineers, though room was left to some Englishmen to devise new and adventurous expeditions, and a similar observation applies to the German Alps, which are, at the same time, less difficult of access.

It may be a satisfaction to future travellers if the writer here expresses his conviction that, in spite of all that has yet been done, no portion of the Alps can, in a topographical, and still less in a scientific sense, be said to be thoroughly explored. In districts supposed to be well known, an active mountaineer will constantly find scope for new expeditions; and if he has cultivated the habit of observation, he may, at the same time, make these subservient to the increase of knowledge.

It has been a matter of great difficulty to reconcile the necessity for compression with the abundance of materials at hand, and the writer cannot expect to escape criticism from readers who may find one or other subject imperfectly treated. Though it is hoped that the work will be found useful for reference, as containing a large body of topographical and other information, it is primarily intended for Alpine travellers, and the object kept in view has been to select the matter most likely to be of use and interest to that class. Had it been designed as a history of Alpine adventure, it would be open to the reproach that it does not adequately notice the labours of earlier explorers, such as Saussure, Hügi, Zumstein, and many other surviving travellers, nor often refer to the earlier authorities. The writer has perhaps more reason to fear that tra-

vellers may reproach him for having admitted too much matter, than for undue brevity.

In respect to expeditions which have been made but once, or very rarely, the writer has usually given the account in an abridged form, but in the actual words of the traveller whose initials are subscribed, the names being given in full in the annexed page of Explanations.

To the authors of these notes, which have for the most part been communicated in MSS. to the writer, he begs hereby to express his cordial acknowledgements, and his hope that they will continue to furnish further information towards the completion of the work. At the risk of appearing to fail in more special acknowledgement to others who have contributed valuable matter, he feels bound to offer his especial thanks to Messrs. W. Mathews, jun., and F. F. Tuckett, and to the Chanoine Carrel, of Aosta. The two former gentlemen, in particular, have afforded invaluable assistance by the corrections and hints which they are each so well able to afford, and which were the more necessary as the work has been for the most part executed at a distance from England, and with but limited opportunities for consulting works of reference.

Several words not generally admitted in the sense here intended have been employed, along with foreign words having no exact English equivalents. Thus: 'pedestrian,' 'mountaineering,' 'glissade,' 'bergfall,' and several others have no other excuse than convenience to justify their introduction.

J. BALL.

AUTHORITIES QUOTED.

The following is a list of the chief authorities quoted in the following work, with the initials by which they are distinguished :—

- T. F. B. Sir Thomas Fowell Buxton, Bart.
- J. J. C. John Jermyn Cowell, Esq.
- H. B. G. Hereford Brooke George, Esq.
- J. G. Major J. Greenwood.
- W. C. J. W. C. Jacomb, Esq.
- S. W. K. Rev. S. W. King.
- E. L. A Lady.
- W. M. William Mathews, jun., Esq.
- M. Murray's 'Handbook for Switzerland, Savoy, and Piedmont.'
- L. S. Rev. Leslie Stephen.
- F. F. T. F. Fox Tuckett, Esq.

ABBREVIATIONS AND EXPLANATIONS.

The following are the chief abbreviations used in this work :—

hrs., min. — for hours and minutes. When used as a measure of distance, one hour is meant to indicate the distance which a tolerably good walker will traverse in an hour, clear of halts, and having regard to the difficulty of the ground. In cases where there is a considerable difference of height, the measure given is intended as a mean between the time employed in ascending and descending, being greater in the one case and less in the other.

ft., yds. — for feet and yards. The heights of mountains, &c., are given in English feet above the level of the sea, and are generally indicated in the manner usual in scientific books, by the figures being enclosed in brackets, with a short stroke.

m. — for mile. Unless otherwise expressed, distances are given in English statute miles.

rt., l. — for right and left. The right side of a valley, stream, or glacier, is that lying on the right hand of a person following the downward course of the stream.

The points of the compass are indicated in the usual way.

Names of places are referred in the Index to the pages where some useful information respecting them is to be found.

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INTRODUCTION.

Art. I.—Preliminary Information.

PASSPORTS.—MONEY.—CUSTOM-HOUSE REGULATIONS.—MEASURES.—
ELECTRIC TELEGRAPH.—POST-OFFICES.

Passports.—English travellers are not now required to produce passports in France, Italy, or Switzerland, and in the Austrian States they are rarely called for, except on passing the frontier. Notwithstanding these changes, it is very unwise to travel without a document, which throughout the Continent is the legal mode of establishing the identity of the bearer. At Post-offices and other public establishments it is convenient, if not indispensable; and at a time when political refugees, and persons charged with graver offences, are objects of suspicion, or it may be of arrest, those who may suffer by mistakes as to identity have no reason to complain if they neglect the best means for securing themselves against such accidents.

Passports are procured at the Foreign Office, Downing Street, by leaving or sending a recommendation from a member of Parliament, or banker, or a certificate of identity signed and sealed by a magistrate, clergyman, solicitor, or surgeon. The passport is delivered on the following day upon application, either personally or by message, and the payment of a fee of 2s. The application must state the name in full of each male member of the family, and that of each man-servant; but where there is any probability of members of the same party separating, it is better that they should be provided with separate passports. The passport should always be carried on the person, as the few occasions when it may be required can rarely be foreseen. The *visa* of a minister of each foreign State in which the bearer intended to travel was formerly indispensable, but this is no longer required, except for the Austrian dominions. It is best to procure this at the Austrian Embassy in London—Chandos House, Cavendish Square—where the *visa* is given gratis between 12 and 2 o'clock daily. In default of this precaution, the *visa* may be obtained in any capital city of the Continent where an Austrian minister is accredited, in which case the previous *visa* of the British minister to the same Court is required. There are several Passport Agency Offices in London where the whole business of obtaining the passport, and any needful *visas*, is transacted for a small fee. This is especially convenient for persons residing in the country.

Money.—The coinage of Switzerland and Italy has now been assimilated to that of France, and accounts are kept in francs and centimes. The

consequence is, that the best coin for travellers to carry in those countries is the French gold Napoleon of 20 francs. It is often convenient to procure Napoleons in London before starting for a journey, and the exchange is usually rather more favourable than on the Continent, varying from 25 fr. 10 c. to 25 fr. 25 c. for the pound sterling. Exchange offices, at which the *fair rate of Exchange* is given, are—for the west end of London, Messrs. Smart, 69 Princes Street, Coventry Street; for the east end, Messrs. Spielmann & Co., 79 Lombard Street.

English sovereigns and bank of England notes can be exchanged in most towns on the Continent, and are generally taken by the principal hotel-keepers, but in many parts of Italy and Germany they are little known, and are not readily taken at their true value.

In Piedmont and Lombardy old pieces of silver alloy, worth 40 centimes and 20 centimes, are still in circulation.

In the Austrian States the coinage has undergone many changes during the last 20 years. The present coinage consists of silver florins, closely agreeing in value and appearance with the English two-shilling piece, and of quarter florins, corresponding in value to the English sixpence, but of larger size. This silver coinage is found in circulation only in the Venetian Provinces of Austria, and within that territory the smaller subdivisions are supplied by a special copper coinage not current elsewhere. The florin is divided into 100 soldi, and pieces in alloyed metal of 10 and 5 soldi supply the intermediate steps between the soldo and the florin and quarter florin. It may be remarked that the soldo and 10 soldi pieces correspond exactly with the mill and cent of the proposed decimal division of the pound sterling. It is remarkable that in Switzerland, in Austria, and in most parts of Italy, the coinage has been changed within the last few years without any appearance of the inconvenience and dissatisfaction that have been apprehended in this country by the opponents of change.

In the Tyrol and the Austrian districts of the Eastern Alps, the place of the silver florin is taken by paper money. The Government notes which usually represent the value of 1 florin, 5 florins, or 10 florins, being inconvertible, are depreciated to an extent that has varied of late years from 8 to 20 per cent. Strangers, arriving with a supply of silver money, are liable to lose the advantage of the difference of value between this and paper money if they omit to exchange their silver for whatever amount of bank notes they are likely to require. In the German provinces of Austria the florin, or gulden, is divided into 60 kreutzers.

Accounts in the Tyrol are still sometimes kept in gulden schein, a description of depreciated money which has long ceased to have legal existence, but which survives in the reckoning of the country people. In this system the florin was gradually reduced in value till worth about 10*d.* English, and the kreutzer the 6th part of a penny. When a demand is made that seems unreasonable, the best plan is to assume that it is made in *schein*, and to enquire how much the sum named will make in bank notes.

In Bavaria the current coin is the new German florin, worth rather more than 2 francs, or about 1*s.* 8½*d.* English, each florin being divided into 60 kreutzers.

A little experience teaches travellers the importance of being always provided with small coins of the country, and when it is possible to procure a

supply before arriving at the frontier, it is generally both convenient and economical to do so.

Circular Notes for sums of £10 and upwards are issued by many of the London Joint Stock and Private Banks, and may be cashed in most of the chief towns on the Continent. By taking the precaution of keeping the notes separate from the letter which accompanies them, the holder is secure from ultimate loss, though not from inconvenience in the event of losing the one or the other. The correspondents of the English bankers to whom these letters are addressed in France, Italy, or Switzerland, usually give pretty nearly the current rate of exchange, clear of any charge for commission. According to the writer's experience the same cannot be said in South Germany, and he has found it a far more economical plan to travel in that country with French gold, which can be changed in every town at the current rate of exchange, and to avoid dealings with bankers.

Custom-House Regulations.—The regulations affecting travellers are not usually very strict; the examination of luggage at most foreign Custom-houses is now little more than a formality, and is often confined to one or two out of a large number of packages. Of the articles generally carried by travellers, cigars and dresses of cotton or woollen material, not made up, are those usually liable to duty. As a general rule, it is much better to declare such articles. A small number of cigars may usually be taken free. In sending heavy luggage from one place to another, it should not be forgotten that whenever it passes from one State to another it is liable to examination at the frontier. The keys should be attached in such a way as to be accessible to the Custom-house officers.

As a general rule, official persons on the Continent are civil and obliging when treated with the courtesy to which they are accustomed. Both in Italy and Austria this holds almost universally. In Prussia, and at times in France, the case is otherwise; and the temper of the traveller is tried by the rudeness of underlings. But unless the case be serious enough, and the facts sufficiently plain, to call for a complaint to the official superior, a wise traveller will disregard misconduct which he cannot resent effectually, and which it is undignified to meet by an unavailing show of anger. These subordinate officials often have it in their power to cause great annoyance to a stranger, while he is powerless as regards them, and he will do best to avoid an unequal encounter.

Measures.—To the traveller, and even to the readers of books of travel or scientific works, the want of an uniform system of measures among civilized nations is a constant source of inconvenience. The gradual extension on the Continent of the French metrical system, which, though not free from defects, is the best yet adopted by any government, has mitigated without removing this source of annoyance. In the territory included in this work several systems adopted by government authority, and several old measures, are still in use among the country people.

The measures most needed by a traveller are here given with their equivalents in English standard measure: a complete list would be beyond the scope of the present work.

French Measures.

1 Mètre	=	3·2809 Eng. feet	=	3 ft. $3\frac{3}{8}$ in. very nearly
1 Décimètre ...	=	3·937 Eng. in.	=	3 in. 11 lines nearly.
1 Millimètre ...	=	·03937 Eng. in.	=	$\frac{1}{2}$ line nearly.
1 Kilomètre ...	=	3280·9 Eng. feet	=	$\frac{5}{8}$ furlongs, less by $6\frac{1}{2}$ yards.
1 Myriamètre ...	=	10 kilomètres ...	=	6 miles 1 furlong 156 yards.
1 Hectare	=	10,000 sq. mètres	=	2 acres 1 rood 35 perches very nearly.
1 Old Paris Foot	=	1·066 Eng. foot	=	1 ft. $9\frac{1}{8}$ lines, or $1\frac{1}{15}$ ft. nearly.
1 Lieuede Poste	=	4 kilomètres ...	=	$2\frac{1}{2}$ miles, less by 25 yards.
1 Kilogramme ...	=	2·204 lbs. avdps.	=	2 lbs. $3\frac{1}{4}$ ozs. nearly.

The Paris foot, though it has long ceased to have legal currency in France, is still used in works printed elsewhere, and the heights of mountains, &c., on many of the maps of Switzerland are given in this measure.

Swiss Measures.

1 Swiss foot	=	3 décimètres ...	=	11 inches 10 lines nearly.
1 New Swiss Stunde	=	16,000 Swiss feet	=	3 miles, less by 92 feet.
1 Swiss Post	=	3 Stunden	=	9 miles, less by 92 yards.
1 Old Swiss Stunde	=	5375·5 mètres ...	=	3 miles 2 furlongs 153 yards.
1 Swiss pound	=	$\frac{1}{2}$ kilogramme ...	=	1 lb. $1\frac{1}{2}$ oz. nearly.

The old Swiss Stunde, still used by the country people in many parts of the country, represents more nearly than the new measure the average distance travelled in an hour by a man on foot over a moderately rough country road.

Italian Measures.

1 Piedmontese mile	=	2466·08 mètres ...	=	$1\frac{1}{2}$ miles 57 yards.
1 Italian mile	=	1851·85 mètres ...	=	1 mile 1 furlong 45 yards.
1 Italian post	=	8 Italian miles ...	=	9 miles 1 furlong 142 yards.

The metrical system has been introduced within the last few years, but a variety of local measures are still used. The Piedmontese mile is confined to the west and north of Piedmont; throughout the rest of the north of Italy the Italian or geographical mile is in general use.

Austrian Measures.

1 Vienna foot ...	=	·3161 mètre ...	=	1 foot $5\frac{1}{3}$ lines or $1\frac{1}{27}$ feet nearly.
1 Klafter	=	1·8966 mètre ...	=	6 feet 2 inches 8 lines.
1 Austrian mile	=	4,000 Klafter ...	=	4 miles 5 furlongs 157 yards.
1 Austrian post	=	2 Austrian miles	=	9 miles 3 furlongs 93 yards.
1 Vienna pound	=	·56 kilogramme	=	1 lb. $3\frac{3}{4}$ oz. nearly.

Electric Telegraph.—Travellers are not so fully aware of the convenience afforded by the electric telegraph as they probably will be hereafter. In no country is the telegraph so extensively in use as in Switzerland. All the towns, and many smaller places, are now connected together, and for one franc a short message may be sent by which rooms are secured, or any other requisite provision made in anticipation of the traveller's arrival. During the crowded season, when ladies are of the party, it is always expedient to write or telegraph for rooms.

The telegraph is also available in many parts of the N. of Italy, along the main roads in Austria, and in the French Alps.

Post Offices.—Serious inconvenience and anxiety is sometimes caused by the non-receipt of letters addressed to travellers on the Continent. The cases of failure of letters sent from the Continent to England are much less common, and rarely happen to persons who take the trouble of carrying their own letters to the post-office, and not trusting them to waiters and messengers. The French post-office rules are needlessly strict, and the clerks often disobliging and rude, after the fashion of French officials; but letters very rarely go astray. The Italian practice is, on the contrary, too lax. Letters are often given to any stranger who chooses to apply, without a passport or other evidence of identity; and, in the case of foreigners, a parcel of letters is sometimes handed to the applicant, who may take from it such as he thinks proper to claim. The German post-offices do not often give cause for complaint when letters are very clearly addressed, except that delay sometimes occurs which is attributed to the curiosity of the police. The worst managed post-offices in Europe, unless a great reform has been very recently effected, are those of Switzerland. Instances of scandalous carelessness and neglect have been so common as to be a serious drawback on the pleasure of travelling in that country.

As a general rule the safest plan is to have letters addressed to the care of a banker in any city where the traveller intends to receive money; or else to some well-known hotel, where the traveller is already known, or to which he writes, announcing his arrival, and requesting that his letters may be taken in and kept until he shall claim them. Unless this precaution be taken it is better to have letters addressed *Poste Restante*. In remote places in the Alps it sometimes happens that the village where the traveller puts up is a dependency of some more important place in the same valley, and that letters addressed *Poste Restante* are retained at the chief office.

The facility for forwarding luggage safely from one place to another, addressed to the *Poste Restante*, is of great convenience to Alpine travellers. The charge is generally very moderate; but not so in Switzerland, where 30 or 40 francs are sometimes payable for a single portmanteau sent from one town to another.

It is now generally known that it is better to avoid the addition 'Esquire,' in addressing persons on the Continent, and that to avoid confusion it is advisable always to add the Christian name, with the French prefix 'Monsieur' or 'Madame:' e.g., 'Monsieur Robert Smith'—'Madame Sarah Brown.'

Art. II.—Routes for approaching the Alps.

It is true that a person travelling by railway sees less of the country through which he goes than those who travel with post horses along a road, yet it may be safely asserted that no class has profited more by the extension of railways than tourists in the Alps. To that large majority who are limited either as to time or money, the means of crossing half Europe with an outlay of but 24 hours in time, and a trifling expenditure of money, very often makes a tour possible which otherwise would never have been undertaken. The extension of railways on both sides of the Alps has not merely enabled strangers to approach the Alps with little loss of time, but has greatly increased the facilities for passing from one part of the chain to another; so that a

traveller may now combine in a single tour visits to several different and distant districts, allotting to each of them a fair share of time, and expending but very little upon the intermediate space. As every traveller will refer to the latest railway guide for the latest information as to hours of starting and arrival, the fares, and other particulars regarding each line by which he means to travel, we shall here do no more than direct attention to the chief lines of railway by which various parts of the chain of the Alps may conveniently be approached.

The most direct route from London to most parts of the Alps is by Paris. To reach Savoy or the south of Switzerland the shortest way from Paris is by the Lyons railway as far as Macon, and thence by Amberieu to the Culoz Junction station. Here the original line is carried on to Geneva, while the Victor Emmanuel railway passes southward to Chambéry, and to St. Michel, the present terminus of the line, which is destined to traverse the Alps by the tunnel near Modane. There is but one direct train daily from Paris for Geneva or Chambéry. This is the night express, starting at 8 P.M., and carrying none but first-class passengers as far as Macon. Geneva is reached in $14\frac{3}{4}$ hrs., Chambéry in about 15 hrs., and St. Michel in about $17\frac{1}{2}$ hrs. Those who dislike night travelling may leave Paris at 11.5 A.M., on the preceding day, sleep at Macon, and take the train there at 5.30 A.M., on the following morning.

By one or other of the two lines here mentioned the traveller may within 24 hrs. from Paris reach almost any point in the main valleys of the Alps of Savoy or South Switzerland. St. Michel is about the centre of the valley of the Arc, and the diligences to Turin take passengers on to Modane or Lanslebourg (§ 7). The junction of the valley of the Arc with that of the Isère is close to the Chamousset station, and a traveller finds there a diligence or omnibus by which he may at once proceed to Albertville, Moutiers, or Bourg St. Maurice (§ 7).

Arriving at Geneva before 11 o'clock, the traveller anxious to proceed at once on his way, may easily reach Sallanches, St. Gervais, or Samoëns, on the same evening, and, if in hot haste, may even arrive at Chamouni before the night is far advanced. Taking the train by the Ouest Suisse railway, which starts at 11.30 A.M., he may not only establish himself in some of the tempting spots to be found on the Lake of Geneva, but may reach before night many of the chief places in the valley of the Rhone and its lateral valleys. Thus Champéry is accessible from Bex (§ 17), and Orsières from Martigny (§ 18), or by sleeping at Sion, the present terminus of the railway, or at Sierre, or Turtman, which may be reached by road, the traveller may, on the following day, find himself, in the very heart of the Pennine chain at Evolena, Zinal, or Zermatt, unless his aim be the range of the Bernese Alps, in which case he will, with equal ease, reach Kandersteg or An der Lenk.

If the Dauphiné Alps be the first object of the tour, the most direct course will be from Paris to Lyons, and thence to Grenoble, 13 hrs. 35 min. from Paris by the express night train. There is no difficulty in at once continuing the journey to Bourg d'Oisans (§ 8), or La Mure (§ 9). Uriage is also most easily reached from Grenoble; but Allevard (§ 10) is more conveniently accessible from Montmélian on the railway from Chambéry to St. Michel.

A line of railway, which will be found of much importance to Alpine

travellers, is that which connects Paris with Neuchâtel by Dijon, Salins, and Pontarlier. The railway from Dijon to Neuchâtel *viâ* Salins is open throughout. The trains from Paris takes $13\frac{1}{2}$ hrs. This is the most direct route for English travellers bound for the Bernese Alps or the Lake of Geneva.

At present the shortest route from Paris to most parts of Switzerland is by Bâle. Formerly it was necessary to make a long detour by Strasbourg, but a more direct line by Troyes, Langres, and Mulhouse, has been open for the last few years. By the only quick train, which is the night express, Bâle is 13 hrs. 10 min. from Paris, and there is time to reach almost all the easily accessible points in the Alps of central and northern Switzerland in the course of the following day, by the branches of the Central Swiss railway diverging from Olten, and leading to Thun, Lucerne, or Zurich.

Although the shortest way from London is by Paris, since Bâle is reached in 26 hrs., a majority of travellers prefer the far more interesting route by Belgium and the Rhine. Those who are not much pressed for time allow at least three days between London and Switzerland. Leaving London at 8.30 P.M., and taking the steamer from Dover to Ostend, they reach Cologne soon after 4 P.M., and can either spend the evening there, visiting the cathedral, or go on to Bonn. The next day is spent in the Rhine steamer, sleeping at Mayence or Frankfort. On the third day Bâle is reached by railway at 4.39 P.M., in time to continue the journey to Berne, Lucerne, or Zurich on the same evening. Since the opening of the Rhine railway from Cologne to Mayence, those who travel by this route may save a day at the cost of seeing little or nothing of the scenery of the Rhine. A train starts from Cologne at 5.15 P.M., reaching Mayence at 10.10 P.M. Taking the train next morning to Ludwigshafen at 7.15 A.M., and crossing the Rhine to Mannheim, the traveller catches the express train to Bâle at 9.55 A.M., and reaches Berne, Lucerne, or Zurich in less than 50 hrs. from London, passing the first night on board the Ostend steamer, and the second at Mayence.

Eastward of Bâle the next main line of approach to the Alps is by the Lake of Constance. Two lines of railway reach the shore of the lake. The Wurtemberg railway, whose terminus is at Friedrichshafen, carries passengers from the N. and NW.; the Bavarian Railway, ending at Lindau, is the route for those coming from the centre and east of Germany. For travellers from England the advantage in point of time is still with the route through Paris; but the difference is not great, and the expense is greater. Leaving Paris by the night express, travellers reach Strasbourg at 7.30 A.M. There is just time to breakfast, and to reach the Kehl station in time for the so-called express train (very slow), starting at 9 A.M., passing the Bruchsal Junction about 11.30, and arriving at Stuttgart at 1.45 P.M. After a halt of $2\frac{1}{2}$ hrs. the train for Friedrichshafen leaves Stuttgart at 4.15, and reaches its destination at 10.45 P.M., in about $26\frac{1}{2}$ hrs. from Paris.

By the Cologne route, a traveller who has left London at 8.30 P.M., and reached Mayence at 10.10 on the following evening, may arrive at Friedrichshafen by the late train on the following day in $50\frac{1}{4}$ hrs. from London, spending two or three hours on the way in Frankfort, Heidelberg, or Stuttgart. Passengers less hurried, who have reached Heidelberg on the second day from London, and start at 5.15 A.M. on the following

morning, arrive at Friedrichshafen in time to cross the Lake of Constance, and take the evening train from Rorschach to Coire, which in this way is $17\frac{1}{2}$ hrs. from Heidelberg.

Passengers from the north or east of Germany, taking the express train from Augsburg at 7.25 A.M., reach Lindau at 12.30, and proceeding by steamer to Rorschach, may arrive at Coire at 7.20 P.M.

The steamers on the Lake of Constance, plying four or five times a day between the towns on its banks, and connected with the German and Swiss railways, offer great facilities for travellers, in whatever part of the Alps their destination may lie. Besides the direct line to Coire, there is easy communication with Zurich and the W. of Switzerland, while by landing at the Austrian port of Bregenz they may enter the Tyrol by the road of the Voralberg.

The most direct route to the Tyrol is, however, by Munich and Innsbruck. Munich may be reached in about 24 hrs. from Paris by way of Strasbourg, Bruchsal, and Ulm, and in less than 14 hrs. from Frankfort-on-the-Main, or 1 hr. more if the Aschaffenburg line be reached from Mayence instead of Frankfort. Travellers arriving at Munich by the express train at 8.30 P.M. may go on at once to Rosenheim—the junction station for Innsbruck—or to Salzburg. The distance from Rosenheim to Innsbruck is less than 4 hrs. by railway; but the trains seem to be ill-arranged, and there is usually much delay at the Austrian frontier station of Kufstein.

The railway from Vienna to Trieste may be said throughout the greater part of its course to skirt the eastern extremity of the chain of the Alps, and therefore serves as the most convenient route for travellers proceeding to the Styrian or Carinthian Alps. For some reason not intelligible to ordinary understandings, the management of railways not being regulated by simple motives of public convenience, the direct line from England and N.W. Germany to Vienna, by Nuremburg, Ratisbon, and Passau, is not available for travellers who object to delay at each of those stations, and passengers from Frankfort or Mayence are forced to make a long detour by Augsburg and Munich, employing $28\frac{1}{4}$ hrs. from Mayence, and an hour less from Frankfort. Grätz is reached in 6 hrs. from Vienna by express train, and Marburg on the Drave in $1\frac{1}{2}$ hr. more.

The same line of railway from Vienna to Trieste, with the branch connecting it with Venice, Milan, and Turin, by Goritz, Udine, and Treviso, offers a convenient means for connecting a tour in the Eastern Alps with a visit to the lakes and valleys of Lombardy and Piedmont.

It is on the southern side of the main chain of the Alps that the mountain traveller derives the greatest advantage from railway communication. All the principal valleys open into the main valley of the Po. For the western half of the chain Turin forms a natural centre of communication, which is now connected with seven towns at the opening of as many different valleys, namely, Cuneo, Saluzzo, Pinerolo, Susa, Ivrea, Biella, and Arona. It is thus easy to pass in a few hours from any one of these places to the other, thus avoiding the delay and inconvenience of a hot journey by road across the plain. Other lines, connecting the plains with the southern valleys of the Alps, are in progress. At present there are opened the lines from Milan to Como by Monza, and to Lecco, by Bergamo, and the important line from Verona to Botzen, by which the traveller, starting in the morning

from the plain of Italy, may reach before night the heart of the Tyrol Alps.

Railways on the Continent differ much in respect to the relative comfort, or discomfort, of the second-class carriages. In Italy and Germany they are usually well fitted-up, and are often used by travellers of the higher class, and sometimes, though less commonly, by ladies. In Belgium they are less comfortable, and the same is true in France, where, as a general rule, express-trains take first-class passengers only. On a long journey it is always best to travel in first-class carriages.

Art. III.—Plan of a Tour.

The tastes of travellers in the Alps are too different, and the objects which they propose to themselves too various, to make it easy to offer useful advice respecting the plan of a tour. The desire to see as many remarkable places as possible within a given time is so natural in beginners, that it is useless to contend against it. Nothing but experience suffices to prove that to derive the fullest and most permanent satisfaction from natural scenery, even more than from other sources of æsthetic enjoyment, time is an essential element. When the impressions retained after a visit to some chosen district—where the same grand objects have been viewed repeatedly and in varied combination, under those changeful conditions of sky and colouring that constantly succeed each other in mountain countries—are compared with the imperfect recollections that remain after a hurried tour, most persons discover that they do not in truth make the most of their time when they arrange an expedition to the Alps, with a view to do as much as possible within a given number of days and weeks. It is gradually ascertained that the true plan of a tour in the Alps is to select a succession of places combining the requisite attractions as head-quarters, and to arrange the journey so that as much time as possible shall be devoted to these, while as little as possible shall be given to travelling from one to the other. It is true that the advantages of such a plan are far more evident to those who are fortunate enough to have some pursuit, scientific or artistic, which connects itself naturally with their journey. The weather in mountain countries is subject to frequent change, and there are days when the scenery is hidden behind a veil of cloud, rain, or snow. To the unemployed tourist inaction is so irksome that he prefers to trudge doggedly along an Alpine track, seeing nothing of the country, rather than await fair weather in a mountain inn; while to the naturalist or geologist, or other traveller with an occupation, such days, if not too frequent, are acceptable as giving time to digest and put in order the materials accumulated during preceding mountain expeditions.

This work is designedly arranged so as to direct travellers to the most convenient centres in each district of the Alps, and those especially fitted to serve as head-quarters are pointed out in the remarks prefixed to each section. To these indications, and to the body of the work, travellers of some experience are referred. The outline tours prefixed to each division of this work are intended mainly for those who wish within a short time to visit the most remarkable scenes accessible to persons of moderate strength and

enterprise. Although arranged so as to correspond with the three main divisions of the Alpine chain, it is easy to combine portions of one with the other, so as to suit individual wants.

Art. IV.—Modes of Travelling in the Alps.

Railways.—In a preceding portion of this Introduction (Art. II.) most of the railways that approach, or partially penetrate, the chain of the Alps have been referred to. Apart from the facilities they afford for travellers arriving from a distance, the Swiss and Italian railway systems are of great service to mountain travellers by enabling them with the least possible expenditure of time and trouble to transfer themselves from one centre of interest to another. Few persons will suppose that passing through a mountain country in a railway carriage can enable them to form any correct idea of its attractions, yet there are a few lines, especially those from Culoz to St Michel, from Geneva to Martigny, and from Botzen to Verona, where a succession of beautiful pictures is unrolled before the traveller's eyes. When going from one place to the other in the order mentioned above, he should endeavour to secure a seat on the rt. hand side of the carriage. Travelling in the opposite direction he should of course prefer the l. hand seat.

Steamers.—All the principal lakes of the Alps are now traversed by steamers. Wherever they exist they offer an easy, speedy, and economical mode of travelling of which tourists are not slow to avail themselves.

Posting.—Since the general extension of railways and steamers has made a private carriage a positive incumbrance to the traveller, posting has become unusual except on certain lines, such as the passes of the Splügen and Mont Cenis, where, by mutual arrangement between the postmasters, the same carriage may be taken throughout. Those who dislike the slow pace of voituriers, and do not object to the trouble of changing the carriage at each relay, may sometimes with advantage resort elsewhere to posting. In Switzerland, Italy, and the Eastern Alps, especially Bavaria, the carriages found at the post stations are generally convenient, and in many large towns a carriage may be hired for a tour, and consigned at the end of the time to some correspondent of the owner. In Switzerland and the German Alps a solitary traveller, with a moderate amount of luggage, may post in a one-horse char, at a rate little exceeding the hire of a country vehicle of the same description. In Italy there is scarcely a village reached by a road where a vehicle of some description may not be easily hired, but it requires some experience to resist overcharges. Details respecting the separate tariffs are found in the notes prefixed to each division of this work.

Voiturier (Ital. *Vetturino* ; Germ. *Lohnkutscher*).—By these names a class of persons entirely unknown in England, but very widely spread over the Continent, is designated in France, Italy, and Germany. The profession attained its highest development in Italy, and in spite of the interference of railways it still flourishes throughout the peninsula. The vetturino, in that country is a man who keeps for hire a carriage and horses, with which he is prepared at all times to undertake a journey of any extent, and in any required direction. The wealthier men of this class often have a large

number of vehicles which usually ply along a particular line of road, and in that case they are often able to arrange so as to change horses on the way when the traveller is pressed for time. As a general rule, however, the vetturino makes the entire journey with the same horses, undertaking to supply others if his own be disabled, and he should be bound to pay all charges for tolls, bridges, extra-cattle attached to the carriage in long ascents, and all other incidental charges. The Swiss voituriers found at Geneva, Berne, Lucerne, Coire, &c., are as a class similar to those of Italy, and in both countries there is no great difficulty in finding tolerably comfortable carriages and good horses. The average distance travelled is from 35 to 45 miles a day, and while on the road they travel nearly or quite as fast as post horses, but a rest of at least two hours is required in each day's journey. To a party of friends travelling through a fine country, and not pressed for time, this is often an agreeable mode of travelling, and those who are unable to ride or walk may, sometimes with advantage take the same vehicle for the whole, or a considerable portion, of their tour. In this case it becomes important to select a trustworthy man, and to secure his good conduct by a proper agreement. For this purpose as a general rule, it is expedient to obtain the advice of the hotel-keeper, or other respectable inhabitant of the town where the carriage is hired.

As a general rule, the Italian vetturino, after the fashion of his country, demands considerably more than he means to take, and will have but a mean opinion of his employer if the latter does not beat down considerably the sum first named. With the exception of this point, which is disagreeable to Englishmen, the writer has had little cause of complaint against Italian vetturini. When once they have ascertained that extortion will be resisted, they usually forbear further attempts in that direction, and are remarkably civil and good-humoured, doing their best to deserve the gratuity which the traveller willingly gives to them at parting. The Swiss voiturier, or German lohnskutscher, is usually, though not always, more direct in his dealings, but is often slow, and obstinate, sometimes sulky and perverse, always a much less pleasant fellow than his Italian comrade. The Savoyard is at least as anxious to overreach as the Italian, and is besides often disagreeable. In the French Alps generally, except on the road between Geneva and Chamouni, the facilities for travelling are in all respects inferior to those found in the other countries here named.

The usual charge for a carriage and pair of horses for a short journey of one or two days is from 1 franc to 1 shilling per English mile, including all extras. For a long journey the fair price is from 25 to 30 fr. per day; but if the carriage be discharged at a distance from home, a demand is made for back fare at the same rate. When the road is one much frequented this should be resisted, but some extra payment on this account is usually made. It is often possible to arrange a tour so as to return to the town whence the traveller started, or to its neighbourhood, and this is both economical and otherwise convenient, as heavy luggage may be left in the charge of the hotel-keeper. For a short journey a written agreement is not necessary, but it is well to make the verbal agreement in the presence of the hotel-keeper, and to take care that it shall be specific on the point of excluding extra charges on whatever pretext. When it is intended to take the same carriage for a longer time, it is prudent to have a written agreement. This should

reserve to the traveller the choice of route and inns, and specify the rate of payment per day when travelling, with a reduced charge, usually one-half, for days of rest. It should always be provided that the traveller shall be at liberty to discharge the carriage whenever he pleases, on payment according to the time it has been employed, and it is well to add that the carriage shall be reserved exclusively for the use of the hirer, as attempts are sometimes made by the driver to take a passenger with him on the driving seat.

It should be noted that the rate of payment above mentioned is always exceeded on the great passes of the Alps, where the voiturier incurs extra expense for cattle hired to assist in drawing a heavy carriage in the ascent; and that at times when the traffic is very great, increased rates are often successfully demanded elsewhere. A traveller who is able to secure good horses and a comfortable carriage for a tour of some length, at the rate of 40 fr. a day while travelling, and 20 fr. for days of rest, may consider that he has made a good bargain. It is often necessary to pay 5 fr. a day more than those rates. Although it is well to stipulate that the driver shall have no right to demand any gratuity under the head of *bonnemain*, *buonamano*, or *trinkgeld*, it is always well to let him know that if pleased with his services the traveller will, at his own option, make him some moderate extra payment at the close. About 2 fr. a day is a reasonable gratuity.

One of the chief inconveniences of travelling by voiturier arises from the various forms of speculation to which it gives rise. Each voiturier is in some way connected with numerous innkeepers and other persons, who hope, by his aid, to make a profit out of the traveller, and various devices are used to induce or compel the traveller to put up at certain inns in preference to others. In towns it is always possible to obtain reliable information, and the traveller should make his selection for himself; but at smaller places, where the choice is limited, it often happens that the inn patronised by the voiturier is in reality the best. It is also not uncommon for voituriers to make private arrangements for the transfer of a traveller and his party from one to the other. An Englishman is often disposed to object to a bargain of which he is himself the object, but the writer has found that unless there be obvious reason for objection, it is better not to resist. The traveller should assure himself that the new carriage and horses are not inferior to the first, and take the same precautions in making his arrangements with the new man that were necessary at first starting. Many complaints have been made as to the voituriers on the road of the St. Gotthard between Fluelen and Bellinzona, and rather more caution is needed on that line than is requisite elsewhere. In the Canton of Berne the local authorities have fixed a tariff of charges for hired carriages which must not be exceeded. It may be found at the principal hotels. This interference with free-trade does not seem to have been imitated elsewhere.

Chars.—One-horse vehicles, fit to travel on rough country roads impassable for larger carriages, are to be found in most parts of the Alps. In the districts frequented by strangers, small light calèches have taken the place of the rougher vehicles used by the country people, which are found elsewhere. These vary in form, and are generally uncomfortable, though convenient for the purpose intended. The *einspänniger Wagen* of the German Alps, and the *carettino* of some parts of Italy, are light narrow carts, with seats hung across, quite unprotected against rain. In other parts of Italy

the *calessina*, or light calèche, protected when necessary against rain and sun, is the common mode of conveyance. In Savoy and South Switzerland the *char-à-banc*, an inconvenient vehicle containing three seats, laid sideways on a pole, and surrounded by a leather curtain, is happily becoming less common. The charge for these vehicles varies from half a franc to 80 cent. per English mile, with a *bonnemain* or *trinkgeld*, of from 10 cent. to 15 cent. per mile. More is often asked, but it should be recollected that in Switzerland and the German Alps the rate for posting little exceeds that amount.

Diligences.—All the great lines of road in and about the Alps that have not been supplanted by railways, are traversed by diligences, and Switzerland is particularly well supplied in this respect. The carriages are tolerably comfortable, and the service generally well conducted, but those who travel to see the country are not likely often to use these conveyances. From the *coupé* and the *banquette*, some limited view is gained; from the *intérieur* and the *rotonde*, next to nothing. The fares in Switzerland vary according as the road traversed lies in the low country or over a mountain pass. In the first case the rate is 80 cent. per Swiss league of 3 miles, in the *coupé*; 60 cent. in the *intérieur* and the *banquette*. On mountain roads the rate is 1 fr. 15 cent. for the *coupé*; 1 fr. for *intérieur* and *banquette*. The French diligences cost rather more, those of Italy and Germany rather less, than the above rates.

On the south side of the Alps omnibuses are found plying between all the towns and large villages and the nearest railway stations. They are extremely cheap, but usually very disagreeable conveyances. They may, however, often be used for sending travellers' spare luggage from one place to another.

Riding.—Horses or mules well used to Alpine paths, and with side-saddles for ladies, are found for hire at most of the places frequented by tourists. As this is the mode of conveyance commonly adopted by ladies, and by tourists unable to walk, it is important to remark that it is only in such places that reliable animals are to be found. Those accustomed to transport merchandise, or to carry wood or forage from the mountains, may be used to rough tracks, and therefore surefooted, but are unaccustomed to the saddle, and liable to become restive in dangerous places. Several narrow escapes from fatal accidents have, within the writer's knowledge, arisen from this cause, usually from a side-saddle carried by some enterprising English lady, and laid for the first time on the back of the animal. Ladies who design exploring the less-frequented valleys of the Alps will consult their own comfort and security, and much reduce their expenses, by arranging their journey so as either to make one longer circuit, returning near to the point whence they start, or a succession of shorter tours, each beginning at and returning to some central place. At each starting point the animals required for the party should be carefully selected, and an attentive guide engaged to accompany the travellers, and take care of the animals during the expedition. With ladies, it is prudent to take a guide for each horse or mule. It is a rule of the first importance to *abstain from interfering with the animal in difficult and dangerous places*. There is scarcely an instance of accident arising from a fall when the animal is left to his own sagacity, but many in cases where the rider has attempted to interfere with him. To this cause is

attributed the unfortunate fate of a French lady, dashed to pieces in 1861 when riding down the Gemmi Pass. In the writer's opinion, it is never wise for a lady to descend along ledges of rock overhanging a precipice otherwise than on foot, or in a chaise-à-porteur. A slight slip in such a situation may endanger the rider.

The usual charge for a horse or mule per day is 9 fr., besides 1 or 2 fr. for the boy who takes care of it. At Chamouni the daily charge is 6 fr., but the same sum is payable to the guide who accompanies it. On the S. side of the Alps there are not many places where mules used to carry a rider are kept for hire. The charge for mules engaged in unfrequented places should not exceed 8 or 9 fr., including the pay of a boy. Return fare at the same rates is always demanded.

Chaise-à-Porteur (Ital. *Portantina*; Germ. *Tragsessel*) is an arm-chair supported by two poles, and carried by bearers. In Savoy and the Valais four bearers are usually considered necessary, and even six where the person to be carried is at all heavy; but in the Bernese Oberland, and in North Switzerland, two men will often undertake to carry a lady of light weight for several successive days. This mode of conveyance is well suited for ladies who are able to walk a little, but fear the fatigue of a long day's ride. Some persons soon accustom themselves to the motion, but to others it is always disagreeable. There is, however, a great difference between men who are used to the occupation, and beginners who jolt and shake the seat in an uncomfortable fashion. The ordinary pay of each bearer is 6 fr. a day, with the same daily pay for the time required to return to the place of departure.

It may safely be asserted that none of the various modes of conveyance here enumerated are more than imperfect substitutes for the only means of travelling completely satisfactory to the lover and student of nature. Walking is so peculiarly the suitable way of visiting the Alps that it is most conveniently discussed separately, in a future part of the Introduction. See Art. VIII.

Art. V.—Guides and Porters.

In the same proportion as the number of strangers annually resorting to the Alps, the inducements to the natives to adopt the profession of guide have constantly increased during the last half-century. The large majority of tourists do no more than follow a frequented path, where one native of the district is as well able to lead him as another. The increased desire to explore the less accessible parts of the Alps, and to undertake difficult and dangerous expeditions, has led to a demand for the services of a superior class of men, who possess in a high degree the special qualities of the mountaineer. Although there is no recognised distinction between the two classes, and the best guide, when not otherwise engaged, is ready to carry a lady's shawl over the easiest Alpine pass, while there are few ordinary guides who acknowledge themselves to be unfit for a difficult ascent, there is in fact as wide difference between them as between the most eminent and the inferior men in any other profession. The practice of taking the same guide throughout an entire tour, which has become very common among Alpine travellers, has led to another distinction, better defined than the last,

between general and local guides. While the latter have no pretension to go beyond the bounds of their own immediate district, the others are men who have acquired a tolerably wide acquaintance with the more frequented parts of the Alps, who speak French or German, and sometimes a little English, and have a sufficient knowledge of the dialects used in different parts of the chain to serve as interpreters, and as useful travelling servants. The men who unite the qualities of the mountaineer with a wide range of local knowledge are naturally the most valuable to the Alpine traveller, and their number is limited, though annually increasing to meet the extensive demand. The best men are usually engaged weeks, or months, beforehand by members of the Alpine Club. An ordinary tourist has no occasion to seek for men of this class, but he may find it an excellent plan to secure the services of a steady respectable man who will accompany him throughout his tour.

In the cantons Berne and Valais, and at Chamouni, the local authorities deliver to each person authorised to act as guide a small book, containing a certificate of good character and general fitness, wherein his employers enter their names, and add such remarks as they think proper. Before engaging an unknown guide it is always expedient to inspect his book, and it is often well to consult the innkeeper before making a choice.

The duty of a guide is not merely to point out the way, but further to make himself generally useful to his employer. He is expected to carry a knapsack of 20 or 25 lbs. weight, and to find himself in the articles requisite for his profession, such as rope and ice-axe. In strictness he is bound to feed himself out of his pay, but whenever it is necessary to carry food to eat on the way, or to pass the night at some mountain chalet where provisions are not forthcoming, it is a matter of course for the traveller to take a supply sufficient for his guide. When a guide is taken for an extended tour, and he is forced to live at inns, most travellers think it reasonable to pay for their guide's living, or else to make him an extra allowance for the additional expense he must incur. The ordinary pay of a guide for an ordinary day's work is 6 francs, and the same daily rate is considered fair for a tour of some length when days of rest alternate with days of severer exertion, save that, as a general rule, a traveller who parts with a guide after several days or weeks of companionship, and who is content with his service, adds a gratuity proportioned to the work done. It must be recollected that the pay of a guide engaged specially for the ascent of any of the higher peaks or more difficult glacier passes, is fixed either by local tariff or by special agreement, at a rate considerably exceeding the ordinary pay; and if several such expeditions be made during a tour of some weeks, it is but just to increase the gratuity given to the guide, although no absolute right to it may exist on his part. The right to pay at the rate of 6 fr. a-day for the return journey from the place where a guide is discharged to that from which he started, unless his services be transferred to another traveller, is universally recognised, and this is one of the reasons which often makes it positively economical to retain the same guide for a considerable tour, where he may be discharged at no great distance from his home.

Guides of the ordinary class are usually found wherever a regular demand exists for their services. In selecting them more caution is advisable on the south side of the Alps than in Switzerland or the Tyrol, but as a general

rule they are well-conducted and obliging. The only defect common among the Swiss guides is a fondness for liquor, a failing that has been injurious to some of the best Oberland men. The higher class of guide, possessing the strength and activity, combined with courage, coolness, and skill, that make the accomplished mountaineer, is formed only by the union of training and experience, with the requisite natural faculties. The raw material may be said to exist wherever chamois-hunting is a favourite pursuit of the young and active men. But this of itself does not suffice. The most skillful Pyrenean chasseur placed on the summit of the Strahleck pass would probably be overpowered with terror, and if unaided would be little likely to reach Grindelwald or the Grimsel; while many of the best Oberland guides would hesitate before trusting themselves on the face of a dizzy limestone precipice, that is traversed with ease by the Aragonese cragsman with his *apurgatus*.

Active men and bold climbers may be found here and there in most parts of the Alps, but it is mainly at Chamouni, in the Bernese Oberland, and in the Valais, that the degree of experience and skill requisite for contending with the difficulties of the snow and ice region of the Alps is to be acquired.

In opposition to the popular belief as to the characteristics of the French and German races, the Chamouni men are marked by steadiness and perseverance, rather than by daring and *dash*. In the latter qualities the Oberland guides take the first place, but as companions in a tour they are seldom so attentive and agreeable, and are usually rather inferior in education. The love of wine and strong drink is much less common among the Chamouni men than in Switzerland. With two or three brilliant exceptions the Valais guides are decidedly inferior to their rivals, being wanting in energy and scarcely reliable in situations of real difficulty. At the risk of doing injustice by involuntarily omitting deserving men, a list of the best guides, and some information as to their special qualities, and the districts with which they are acquainted, is appended to this section.

On the south side of the Alps, and in Tyrol, guides scarcely exist as a class. It is usually easy to find a trustworthy man who is fit to show the way over a well-known pass, and to carry the traveller's knapsack, at the rate of 4 or 5 francs daily. For this purpose the best plan is to apply to the innkeeper, or in remote places to the *curé*, rather than take without enquiry persons who come to offer their services. Men of this class rank with the porters presently to be noticed, rather than with regular guides. A traveller wishing to attempt an excursion of any difficulty in these less frequented districts should enquire for the best known chamois-hunters, for it is amongst these only that he is likely to find assistance; but as men of unsteady character sometimes take to that pursuit, he will do well to ascertain from competent authority that he is in safe hands. In cases of reference to an innkeeper or parish priest, a reserved answer in which the referee declares that he knows little of the man in question, is to be taken as an unfavourable reply. The reference should of course be made before the traveller has committed himself, or declared positively his intention to make the expedition.

Porters.—In the districts where guides exist as an organised body, possessing an exclusive right to exercise that calling, a subaltern class of *porters* has grown up, and in some places has been equally subjected to regulation.

The porter's business is to carry luggage over beaten tracks where there is no need of a guide, or in longer and more difficult expeditions to assist the guides by carrying the heavier articles required for a part of the way. Porters generally are content to receive 5 francs a day, but in the southern valleys of the Alps a traveller undertaking to provide food, may often procure a useful man of this class for about 3 fr. a day. In the Bernese Oberland, porters (Germ. *Träger*) demand 6 fr. a day, but they carry a much heavier weight than is usual elsewhere. Some of these men make no objection to carry 40 or 50 lbs. of luggage a distance of seven or eight leagues.

LIST OF THE BEST KNOWN GUIDES, WITH THEIR ADDRESSES
ALPHABETICALLY ARRANGED.

- Christian Almer** (of Grindelwald). First-rate, uniting daring, steadiness, and intelligence. Well acquainted with the Oberland and the Monte Rosa District.
- Moritz Andermatten** (of Visp. Valais). Good steady man. Well acquainted with the Monte Rosa District.
- Melchior Anderegg** (of Meyringen). First-rate in all respects. There is scarcely a difficult ascent or pass in the Bernese or Pennine Alps which he has not accomplished, most of them in company with the Rev. Leslie Stephen.
- Franz Andermatten** (of Saas). Excellent, strong, and cheerful. Probably the best man in the Valley of Saas.
- Johann Joseph Bennen** (of Laax, Valais). First-rate. 'The Garibaldi of Guides.' Well acquainted with the Bernese and Pennine Alps.
- Peter Bohren** (of Grindelwald). Good, but thirsty. Has mounted most of the Oberland peaks.
- Bartolomé Burgner** (of Saas). Good; local.
- Zachary Cachat** (of Chamouni). An excellent mountaineer, but odd-tempered. Knows the Mont Blanc and Monte Rosa districts thoroughly.
- Jean Baptiste Croz**, and **Michel Croz** (of Le Tour, near Chamouni). Brothers; well known for the remarkable expeditions in which they have accompanied Messrs. W. Mathews and F. F. Tuckett through a considerable portion of the Graian, Tarentaise, Dauphiné, and Cottian Alps. Both are excellent mountaineers, but Michel is generally considered the bolder of the two.
- Ambroise Dayné**, (garde-chasse of Valsavaranche). Excellent cragsman, and good local guide for the central group of the Graian Alps.
- **Hoste, Joseph Jacquet**, and **Lucien Jacquet** (all of St. Gervais). Good guides for Mont Blanc.
- Andreas Jaun** (of Grimsel Hospice). A powerful but rather heavy man. Makes a good second in a difficult expedition, but not fit for leader's place.
- Christian Kaufmann** (of Grindelwald). A strong, steady, and good-tempered man.
- Johann Kronig** (of Zermatt). A young man, very good, up to a certain point, but not steady enough in cases of serious difficulty. He will probably improve.
- Christian Lauener** (of Lauterbrunnen). A good steady guide, good-tempered and obliging. Not quite first-rate.
- Ulrich Lauener** (of Lauterbrunnen). A most powerful man, who has been a first-rate guide. He is of thirsty temperament, and rather noisy when the day's work is over.
- Franz Lochmatter** (of Macugnaga). A very pleasant, good-tempered man, who knows his own district well. Not quite in the first class, but a very good cragsman.

- Christian Michel, Peter Michel (both of Grindelwald). Brothers. Good guides for the Schreckhorn, Wetterhorn, and Eiger. The younger brother is more active, and the more skilful cragsman of the two.
- Michel Payot (of Chamouni). First-rate. Accompanied Mr. Cowell in the first ascent of the Grand Paradis, and elsewhere. He is well acquainted with the Pennine and Graian Alps.
- Peter Perrin (of Zermatt). First-rate. The best guide at Zermatt. Well acquainted with the Pennine and Graian Alps.
- Anton Ritz (of Zermatt). A very promising young man. Is usually employed as waiter at the Riffel Hotel.
- Auguste Simond. An excellent man, and has been a first-rate guide. Rather advanced in years for very laborious expeditions.
- Jean Tairraz (of Les Pras, Chamouni). A good guide, but rather past his prime.
- Jean Tairraz (of Hotel du Mont Blanc, Chamouni). Still acts as guide occasionally. The remark above made as to his namesake applies equally to him.
- Joseph Tairraz (of Chamouni). Very good guide.
- Victor Tairraz (of Les Pras, Chamouni). First-rate. A steady, sure, but not brilliant mountaineer, who is at the same time an obliging, attentive, and serviceable companion. He knows the Pennine and Bernese Alps very well, and also the greater part of the Italian Tyrol.
- Johann zum Taugwald (of Zermatt). Strong and willing, but wants nerve in situations of real difficulty. Not fit for leader.
- Matthäus zum Taugwald (of Zermatt). The same remark as made on the last named applies here. Both men are well acquainted with the Monte Rosa district.
- Peter zum Taugwald (of Zermatt). Although older than his namesakes above mentioned, he is a better guide, a first-rate cragsman, strong and willing. Rather eccentric in his ways.
- Thut (of Stachelberg). Probably the best guide for the Tödi. In common with the other guides of the same place, he makes extortionate demands, which ought to be resisted.
- Viennin (of Zinal). A good local guide.
- Johann Zwalt (of Guttanen?). A good strong guide, useful as second in a laborious expedition. He was for some time at the Grimsel.

Art. VI.—Inns.

So much does the comfort of travellers depend upon the goodness or badness of the accommodation found at inns, that it is not surprising if they exact a degree of accuracy on this point from a guide-book that, from the nature of the case, it is impossible fully to attain. Assuming that the information at the Editor's disposal were always very recent, there is a great degree of uncertainty about the impression left upon a passing traveller by an inn where he remains for one or two nights. One traveller happens to arrive when the house is crowded, the larder ill-provided, the servants and the master tired. He is ill-lodged, ill-fed, and ill-attended, and as a natural consequence his report is highly unfavourable. A few days later another traveller is lodged in the best rooms, finds abundant supplies, and is treated with attention. The second report is, as it ought to be, entirely different from the first. There are but a few hotels of the best class so well arranged,

and under such skilful and active management, as not to be liable to such vicissitudes. In truth, however, the information obtainable often dates back two or three years, and in that time very many changes occur. The management of an inn, especially a large one, requires constant activity and watchfulness on the part of some one directly interested in its success; and it constantly happens that a change of management, or a mere relaxation of the innkeeper's activity, caused by over prosperity or by engaging in other pursuits, reduces a hotel from the first to an inferior rank. At the same time new houses are every year opened in the frequented parts of the Alps, so that between the falling off of old, and the rise of new inns, it is impossible to achieve invariable accuracy. Yet it will probably be found that the indications given here are, as a general rule, more correct than the interested recommendations of voituriers, boatmen, guides, and the like. Those who use this book will confer a favour on the Editor, and on future travellers, if they will note down the inns at which they stop in the course of their tour, with such observations as they consider due, and communicate the same to the publisher for use in a future edition. Such information is useful even in respect to the most frequented places, whether the traveller's judgment agree with that here expressed or not.

It is generally known that no country in Europe is so well provided with inns as Switzerland. The hotels in the more frequented places leave very little to be desired by the most fastidious, and in country places they are generally much superior to similar establishments in our own country. The beautiful valleys of the Italian Alps are far from being equally well supplied, but the increased influx of strangers has led to considerable improvement. Though less frequented by strangers, the Lombard and Venetian Alps are decidedly in advance of Piedmont. The writer has been in the habit of stopping in remote villages and hamlets wherever convenience dictated, without caring to make previous enquiry as to the accommodation to be found there, and he has rarely failed to obtain tolerable food and a clean bed. Higher praise than this is due to the country inns in the Austrian Alps. In the Tyrol, Salzburg, and Styria, and perhaps still more in Carinthia and Carniola, it is a rare exception when a village inn is otherwise than a comfortable and agreeable stopping place, where excellent living is rendered doubly acceptable by the kindly manners of the people of the house, and the charges are so moderate as to make it a matter of surprise how any profit, however small, can be made from the business. The French Alps present a disagreeable contrast. With but very few exceptions, a traveller entering an inn in Dauphiné must be prepared for filth and privation, and not seldom his ill-humour is aggravated by an extortionate bill. The same observations apply, in a somewhat less degree, to the provinces of Maurienne and Tarentaise, in Savoy. The provinces of Chablais and Faucigny, between the valley of the Arve and the Lake of Geneva, partake somewhat of the character of the adjoining parts of Switzerland. Cleanliness and comfort are better understood, and barefaced extortion is not so often attempted. In many Swiss inns, and in some towns in Italy, more attention is paid to the habits and tastes of English travellers than is usual on the Continent. The ordinary hour of the *table d'hôte* being one o'clock, there is often a second *table d'hôte* at five o'clock. English mustard, pretty good tea, and other *desiderata*, are to be had, and some of the

principal hotel-keepers have gone so far as to open an English chapel, and offer inducements to a clergyman to officiate during the summer.

There is but one department in which English inns maintain a superiority over those of every part of the Continent. In the latter the use of water-closets has as yet made but little progress, and even when they exist they are frequently in an offensive condition. The usual substitutes for them are a source of foul smells that too often disgrace even first-rate hotels. In France these places are perfectly horrible, forming an unaccountable exception to the general advance in civilisation. Italy ranks next lowest in the scale; while in Germany and Switzerland some elementary ideas of cleanliness and decency are not foreign to the soil, though there is still much room for improvement. The only way to effect a reform is by repeated remonstrances, and by making it known to innkeepers that attention to this department will attract, while neglect will as certainly repel English travellers. The Editor hereby requests that his correspondents will enable him, by information on this point, to indicate in future editions of this work by a distinguishing mark the houses that deserve favourable or unfavourable notice in this respect.

It is difficult to give information as to the expense of living at inns which can be serviceable to travellers. The effects of railroad communication and fiscal reforms are every year more evident in the tendency towards an equalisation of prices throughout Europe. Some differences will doubtless continue to exist, and Italy and Southern Germany are still considerably cheaper than England or Switzerland. Apart from the fact that the price of living is higher, it is fair to recollect that a large capital is often invested in Swiss inns which remain open but four or five months, or even a shorter time; and that some of them are built in places where constant labour and expense are needed to procure the necessary supplies. The regular charge for a single bed in the better class of Swiss inns is 2 francs, and in second class and country inns $1\frac{1}{2}$ franc. In the larger hotels more is charged for rooms on the first or second floor, and also for those commanding a view. The charge for the early *table d'hôte* at one o'clock is from 3 to 4 francs. For that at 4 or 5 P.M. one franc more is usually demanded. Breakfast of tea or coffee, bread and butter, and *confiture*. or honey, $1\frac{1}{2}$ franc, rarely 1 franc. Eggs and meat are charged separately. Attendance for a single person 1 franc daily. For a party it should not exceed 75 cents, or even less per head. Sitting-rooms are charged daily from 4 to 8 francs each. In the first-class hotels, besides a handsome *salle à manger*, one or more rooms, containing books, newspapers, and a pianoforte, are usually open to persons staying in the house. As it is the practice for ladies to avail themselves of these public rooms, a sitting-room is by no means necessary.

All over the Continent it is the usual custom for persons travelling in a party, and intending to remain some days, to enquire the price of their apartments, and if this appear high to make some observation, which usually leads to a reduction.

Many English travellers are haunted by the disagreeable impression that, in their capacity of Englishmen, they are marked out by innkeepers and others, and made to pay higher prices than are demanded from tourists of other nations. The writer believes that, with rare exceptions, there is now no ground for this suspicion. Formerly, the case was otherwise. So long

as the English were not content to travel in the same manner as foreigners of the same social position, they were naturally treated in an exceptional manner. None but persons of the highest rank and ample means are used on the Continent to have their meals served apart in a sitting-room; and when English travellers, in this and other ways, showed an apparent indifference to expense, it was but natural that they should be treated as if they were so. Of late years our countrymen have not only learned to conform to the usages of other nations, but, as a body, they show themselves quite as attentive to economy as other travellers of the same means and station. As a general rule, inn-keepers are disposed to think that what they call a *famille*, i.e., a party including ladies and one or more servants, is a fair mark for higher charges than they would attempt with single men. Thus a party, perhaps, remaining for a single night, will find wax candles charged in the bill at the rate of two for each room which they occupy. It is necessary to have a deduction made for those not used, and to prevent the waiter from lighting more than are wanted.

In justice to themselves and the public travellers should take the trouble to look over their bills, and to point out for reduction any items that appear unreasonable. Should a simple remonstrance fail, there is generally no use in further resistance. The extortion must be gross indeed that will not be sanctioned by the local authorities, should a traveller lose time by resorting to them. There is but one effective threat to which inn-keepers are usually very susceptible—that of exposure in English newspapers and guide-books, and this, in gross cases, should always be enforced. Cases of shameless extortion are usually confined to the meaner class of inns, or to those which have been opened expressly for tourists in some Alpine route. No reasonable person will object to pay somewhat more than the usual rate of accommodation at an inn set up expressly for the convenience of a limited class, but it is well to make the owners understand that by unreasonably high charges they defeat their own object.

Art. VII.—General Advice to Travellers in the Alps.

Season for Travelling.—The higher parts of the Alps are not easily accessible during the height of summer; but it is not generally known that many districts, including much beautiful scenery, are seen to the best advantage in spring and autumn. In the month of May the neighbourhood of the Swiss lakes, and more especially the valleys of the Maritime, Lombard, and Venetian Alps may be visited with full satisfaction. The vegetation of those districts is then seen in its full beauty, and many mountains of moderate height, commanding noble views, may be ascended without difficulty, though in some seasons a good deal of snow still remains on the secondary ridges. In June the rapid transition from winter to spring, and from spring to summer, is completed throughout all the inhabited valleys of the Alps. For the ordinary tourist, who does not aim at difficult ascents, this would be the best season for travelling, were it not that the weather is usually more changeable than in the three succeeding months. Even for the aspiring mountaineer the second half of June possesses many advantages. The length of the day greatly facilitates long expeditions, the glaciers are more easily traversed, as the crevasses are narrower, and are more covered over by snow bridges, and

slopes of ice or rock, very difficult at other times, are made easy by a covering of snow that yields to the foot. Recent experience confirms this opinion. The first ascent of the Aletschhorn, and several other difficult ascents, have been made towards the end of June, and persons who have crossed the Col du Géant, and other broken glacier-passes, have been surprised to find few or none of the usual obstacles. On the other hand it should be remembered that the snow at this season is ill-consolidated, and that a slight disturbance very easily produces avalanches. Certain couloirs and very steep slopes that are tolerably safe later in the year, are highly dangerous in the early season. The use of the rope, always expedient, is doubly so at a season when most of the crevasses are concealed by snow-bridges of uncertain solidity. There is also the inconvenience that there is usually a greater extent of soft snow to be traversed than later in the season. Another slight drawback to mountaineering in June arises from the fact that the cattle are not yet sent up to the higher pastures. The châteaux to which the traveller resorts for milk, and sometimes for a night's rest, are not yet inhabited. For the same reason nothing can then exceed the beauty of the Alpine pastures, in the full blaze of their brilliant colours, before they are eaten and trodden down by animals.

July and August are the months usually chosen by travellers in the higher parts of the Alps, and on an average of years the public is doubtless right in the selection. August is the season when the inns are most crowded, and a traveller who has moved from place to place in July, does wisely to select comfortable and agreeable quarters for the succeeding month. One reason for passing this time in the higher valleys is the great heat that is then usually experienced in the low country at the foot of the Alps. The experience of many years has led the writer to believe that, on an average, the best chance of finding a continuous succession of fine weather, with the clearness of air favourable for distant views, is during the first half of September. During the summer it is rare to find more than three or four days together such as the mountaineer willingly chooses for an ascent, and even then the distant horizon is rarely clear of clouds. Eight or ten consecutive days of perfect weather are often to be had in September. About the middle of that month snow usually falls on the higher Alps, sometimes descending to the valleys. Those who do not take flight are often rewarded by a renewal of fine weather extending into October. The fresh snow and the shortness of the days make the season unfit for high and difficult expeditions; but it is most enjoyable in the southern valleys, where the great heat of summer is a serious impediment to the pleasure of travelling in the earlier season. The Italian lakes may be visited with satisfaction until the end of October, save that in that month a week or ten days of heavy rain, extending through the entire N. of Italy, may usually be looked for.

Languages spoken in the Alps.—It may safely be said that half the pleasure of travelling is lost to a person who is unable to speak the language of the country through which he passes. Englishmen are more often prevented from speaking foreign languages by shyness and *mauvaise honte* than by indolence or incapacity. As there is little room for shyness in conversing, or attempting to converse, with a guide or waiter, a pedestrian expedition serves to help many persons over the first difficult step of beginning to exercise the tongue in the production of unaccustomed sounds. The region

included in this work is pretty equally divided between the German, French, and Italian languages. German, which has rather the largest share, is spoken throughout nearly the whole of the German Alps, and through three-quarters of Switzerland, the division between the French and German districts nearly corresponding with a line drawn from Porrentruy to Sierre in the Valais. West of that line French is the language of the country, as it is throughout Savoy and Dauphiné, and in the Val d'Aosta, and the Vaudois valleys of Piedmont. With those exceptions, and that of a few parishes at the foot of Monte Rosa, inhabited by a German population, Italian is spoken throughout the southern valleys of the Alps, including the Swiss Canton of Tessin. In the valley of the Adige, which may be said to cut through the dividing range of the Alps, the division between the Italian and German population lies a little S. of Botzen. Elsewhere it usually follows the water-shed.

With scarcely any exceptions the three languages here named are not to be heard in a state of purity in any part of the Alpine region. Dialects, more or less corrupt, have taken their place, but a stranger speaking the pure tongue can make himself understood, though he may find some trouble at first in understanding what is said to him.

Besides the three principal languages, there are three or four others that occupy some small portion of the Alpine region. The Romansch, a distinct language derived from the Latin, and not, as some suppose, a dialect of Italian, is spoken in about two-thirds of the Canton Grisons, and is subdivided into three dialects. Three or four newspapers appear in this language, but German is on the increase, and will probably before long supplant the ancient tongue. In the Sette Comuni, north of Vicenza—a district of table-land and mountain pastures, enclosed between the Brenta and the Astico—a peculiar language, supposed to represent the ancient Cimbric, still holds its ground, but is being rapidly replaced by the Venetian dialect of Italian. Either the same, or an allied dialect, survives in some valleys of the Italian Tyrol, between the Eisack and the head waters of the Cordevole. A larger space is occupied in the Eastern Alps by people speaking the Slavonic dialect, called by the German, *Krainerisch*. From the valley of the Isonzo this extends through the Julian Alps, the Karawankas, and some other parts of Carinthia, Carniola, and Styria. German is, however, spoken by all the younger people of the country, so that a traveller has little trouble from this cause. He should, however, bear in mind that each place has a German and a Slavonic name, and very often an Italian name also, and as these are sometimes quite unlike each other, care is needed to avoid mistakes.

For the mere purpose of living at hotels, and making his way from one place to another, a traveller knowing French only, or German only, will meet no serious difficulty. At most hotels there are servants who speak both languages, and a knowledge of English is very general among Swiss waiters. Those enterprising Britons who travel on the Continent with no other medium of communication than their native tongue, and a well-filled purse, may best make their way by the Rhine, and confine themselves to the Swiss Alps. They do unwisely in attempting to extend their tour to the S. side of the Alps.

Books and Maps.—The number of works connected with the Alps has so much increased of late years, that it would be difficult to give a complete

list. Lists, however, of works or memoirs connected with the geology of the Alps and with the Alps generally are included in ART. XIV.

There is no general series of maps of the Alps that can be recommended, with, perhaps, the exception of Mayor's *Karte der Alpenländer*, in 9 sheets, Perthes, Gotha, 1862. In the preliminary notes to each division of this work, information is given as to the maps most likely to be of use to travellers.

Expenses of Travelling.—The habits and wants of travellers are so various that nothing approaching to a general estimate of the expenses of a tour can be given. It is not, however, difficult for a traveller to frame an estimate for himself. A single man, contenting himself with ordinary fare, and the *vin ordinaire* such as is supplied at *tables d'hôte*, need not spend at inns on an average more than 10 francs a day in Switzerland, or Savoy, or more than 5 or 6 fr. in the Eastern Alps. Should he order fish, game, and foreign wine for dinner, he may easily double the above rate of living. To cover extras, he should allow 8*d.* a mile for every English mile travelled in a one-horse carriage. Assuming him to take a guide, either to show the way or to carry his knapsack, he must in Switzerland and Savoy allow 6 fr. a day on this account, and he may add 2 fr. more that in one way or other his guide will cost him. If his tour will admit of his returning near to the place where he first engages a guide, it will cost him no more to take the same man throughout his tour than to engage a fresh guide every second day for the purpose of continuing his route; since the men so taken must each in succession be paid return fare. Should he intend to make considerable halts on the way, there will, in the economical sense, be a proportional disadvantage in taking a guide who must receive his pay whether employed or not. It may be inferred that, on a rough estimate, a single traveller should allow at least 18 fr. a day for his expenses in Switzerland or Savoy, and a little but not much less in Piedmont, without counting the occasional hire of a vehicle which may considerably increase the total. Two men travelling together will generally find one guide or porter sufficient for both, so that the above estimate would be brought to 14 fr. each. In the Eastern Alps it is easy to find a trustworthy man who will accompany a traveller for any number of days, and consider himself well paid with 3 or 4 fr. a day, besides his food (which may be counted at 1 fr. more), and his expenses in returning to his home. Apart from vehicles, the expenses of a single traveller in the Eastern Alps, speaking German or Italian as the case may be, need not exceed 12 fr. daily for himself and his guide, and those of two companions may be reckoned at 9 fr. each. It is obvious that the above estimates must be reduced in the case of a traveller who does not object to carry his own knapsack, and only occasionally engages a guide where it is imprudent to venture without one. On the other hand, the total must be largely increased when the traveller aims at effecting difficult ascents, or achieving new or little known glacier passes. Where two or more guides receive 30 or 40 fr. each, and it is necessary to lay in an ample store of provisions for two or three days, the expenses of a single excursion may amount to five or six pounds, or even more.

It is still more difficult to estimate the expenses of a party including ladies. Supposing the outlay per head at hotels to be the same as already estimated, there is generally considerably more to be reckoned for cost of conveyance.

It is true that a carriage, costing in all about $1\frac{1}{2}$ fr. per mile, will carry four or five travellers, but whenever mules or *chaises-à-porteur* are taken over an Alpine pass, and sent back on the following day, it is necessary to reckon from 20 to 25 fr. for each mule, and from 25 to 50 fr. for each *chaise-à-porteur*.

When the traveller has made the best possible estimate of the sum he is likely to require for his Alpine tour, he should leave an ample margin for unforeseen expenses, and for the changes of route that are often inevitable. Persons who omit this precaution are sometimes put to serious inconvenience by finding their supplies fail before they have reached the city where they can renew them. A considerable number of Napoleons may be carried without inconvenience in the inside pockets of a waistcoat, and, if travelling in Switzerland, a few English bank-notes, or circular notes of a London banker, may be changed from time to time at the principal inns where the traveller may stop. It is scarcely necessary to remind persons with any experience of the importance of being well-provided with small change, the want of which causes inconvenience and loss.

General Rules for Travelling.—Of these it would be easy to make a long list; a few only are here noted.

It is necessary to arrive at foreign railway stations 20 minutes before the hour fixed for the departure of the train. Failing this, difficulties are made as to receiving luggage, and the travellers are thrust into the worst places in the railway carriage.

All arrangements for vehicles, mules, guides, or porters should be made overnight. He who waits till next morning will find inferior articles and higher prices.

Avoid sleeping with open windows in low valleys, especially those liable to inundation.

Advice as to dietary is little needed, as most people in good health can live on the food they find on their road. It may be noted that Alpine mutton is too often tough and stringy. Veal and fowls are usually the best meat. Chamois venison, when in good condition and kept long enough, is good, but is rarely eaten in perfection. Trout are delicate eating, but are usually rather dear. The same may be said of ptarmigan and *coq de bruyère*. The latter is excellent, but not often to be had.

Very fair wine is made in the Cantons Neuchâtel, Vaud, and Valais in Switzerland, in the neighbourhood of Chambéry in Savoy, in the Val d'Aosta, the Val Tellina, and the valleys near Verona, but the better qualities are rarely found in inns. Those who dislike the ordinary wine, may best call for Beaujolais, a sound red wine found at most inns in Switzerland and Savoy. Some persons like Asti wine, a sweetish insipid liquor, usually to be had in Piedmont, and in many Swiss inns. Barbera is a strong and rough but sound Piedmontese wine, which is found in Italian towns, but as a general rule no wine but that of the district is to be had at Italian country inns. Many travellers like the effervescing lemonade, which, under the name *limonade gazeuse*, is found almost everywhere in Switzerland.

Most of the requisites for travelling are enumerated in Art. VIII. as especially important to pedestrians. A few universal requisites may be noted here.

Stationery, including writing paper, pens, ink, sealing-wax, pencils, and

drawing materials for those who use them, are best obtained in London. The same may be said of soap and an extra toothbrush, wants not well supplied on the Continent. Adhesive luggage labels, and also those of parchment, and a strap for fastening together plaids and other loose articles, should not be omitted. Many travellers carry a telescope, but except for Chamois-hunting, where it is indispensable, this is rarely useful. An opera-glass of moderate size is much lighter, and more useful. It also turns to account in visiting picture-galleries, theatres, &c.

When all other requisites have been supplied, the most important of all must be found by the traveller himself. Good temper and good humour are the only things quite indispensable for the enjoyment of travelling. It is not wise to yield too easily to the demands that are pressed upon a stranger, and every now and then a show of anger may be requisite to defeat imposition, but a man who when travelling labours under the impression that all the world is combined in a conspiracy to maltreat and overreach him, and who loses his self-possession in a dispute about a franc, or because a waiter is slow to answer his summons, will consult his own peace and the convenience of others by staying at home.

Art. VIII.—Advice to Pedestrians.

There are few men in tolerably good health who are not able to walk quite enough to enable them to enjoy nearly all the finest scenery in the Alps. The process of training is to some rather irksome, and it varies from a few days to two or three weeks, according to the constitution and previous habits; but this once accomplished, the unanimous testimony of all who have tried this manner of life, declares that there is none other so enjoyable, and none so healthful for mind and body. Some patience and judicious preparations are needed to arrive at that delightful condition in which any reasonable amount of exertion is borne without fatigue, and a man, after a previous day's walk of 30 miles over mountain and glacier, rises with the sun, refreshed and ready for fresh enterprise. Assuming that, on reaching the Alps, a traveller is not already in good training, he must carefully avoid overworking himself at first. He cannot begin better than by making the ascent of some one of those minor summits that are placed round the outer margin of the great chain, and command views that often rival in beauty the panoramas from the higher peaks. Such are the Dent du Chat, Mont Granier, and Grand Som, in the French Alps; the Dôle, Weissenstein, Rigi, and Hohenkasten, in Switzerland; the Monterone, Monte Generoso, Corno di Canzo, and Grappa, on the Italian side; and very many others that might be added to the list. On arriving at some place that serves for head quarters, it becomes easy for a man to graduate the length and difficulty of his excursions to his increasing powers, being careful, whenever he feels somewhat overtired, to make the following a day of comparative rest.

If his design be to carry his knapsack himself he will do wisely to begin with very short journeys. For the first few days it is felt as a decided incumbrance, and somewhat increases the labours of the day's work; but after a short time the muscles become adapted to the effort, and it is scarcely found to make any difference, except to persons with tender feet, who are apt to feel the effects of the additional weight. For travellers who have not

the instinctive faculty of finding their way without a guide, there is no inducement to take the trouble of carrying their own knapsacks; but quite apart from the saving, which to many may be a matter of indifference, the keen sense of absolute freedom and independence, and the intense enjoyment of nature, unbroken by the presence of even the most satisfactory guide, are motives enough to tempt many a man to rely on himself for his means of conveyance in the Alps. The writer warmly admires and sympathises with the feelings of those who have developed the ardent and aspiring style of mountaineering that has so largely increased our knowledge of the Alps, and all but 'effaced the word "inaccessible" from the Alpine dictionary;' but for the sake of the next generation, he would think it a matter for regret if the life of Alpine travellers were to be always one of struggle and warfare. There is a keen pleasure in storming some citadel of nature, hewing the way axe in hand, or clambering up some precipitous outwork; but the recollections of days of solitary enjoyment amid the more accessible, and not less sublime scenery, leave an impression no less deep and abiding.

Equipment of a Pedestrian.—In giving the results of his own experience, confirmed in most points by that of many others, the writer is aware that temperaments are variable, and that what suits many travellers does not necessarily suit all. The inexperienced will generally do well to try, in the first place, what has been found useful by others.

Clothing.—An Alpine traveller is occasionally exposed to cold and piercing winds, but far more often to great heat, the direct rays of the sun in clear weather having a force which is quite unknown in England. Light woollen clothing is the best adapted to meet either contingency. The linen blouse, though sometimes very convenient, is not fitted for general use. Those who have any pursuit requiring them to carry instruments, note-books, or other extras, will prefer a shooting-coat to any other garment. It should have two inside breast-pockets, with two outside, and two large and strong inner pockets (called hare pockets) in the skirts. Those who may not require so much space should not forget to have at least one pocket large enough to contain a mounted map of large 8vo. size. Like the coat, the waistcoat should contain six pockets, i.e., besides those usually found, two watch pockets, and two inside pockets to fasten with a button, convenient for carrying gold and notes. Knickerbockers and gaiters are undoubtedly preferable to ordinary trousers, but most persons will wait until this dress is more generally known before they carry it on a continental tour.

The covering and protection of the feet is to the pedestrian a matter of the first importance. Half-boots are generally preferred to shoes. They cannot be too solid, strong, and durable in workmanship. In this respect English boots are probably the best. They should be large enough to admit freely the foot covered with the thickest and strongest woollen socks. It is almost impossible to prevail on shoe-makers to estimate properly the strain upon the toes involved in a long and rapid descent of many thousand feet, and to make the front part of the shoe or boot long enough, and broad enough, in this part. The instep is the only part that should be comparatively tight, as the strain and friction is thereby partly removed from the toes, and transferred to the rest of the foot. Another defect often found in English boots, is that the heel is too much thrown back. It should be so placed under the ankle, so as to bear nearly the entire weight of the body when

in an upright position. For ordinary walking the writer is inclined to think that the best defence for the sole of the boot is by placing, at equal intervals of about $\frac{3}{4}$ inch, nails with square steel heads of moderate size, and not projecting more than an eighth of an inch from the surface. The heel should be protected all round by larger and stronger nails. Although this protection is necessary, it is a source of inconvenience when traversing rocks, and the more nails there are in the boots the more caution is needed on smooth surfaces of rock. Every one with the least experience knows that it is rash to commence walking in new boots. They should be worn for three or four weeks beforehand.

The writer has found it very difficult to procure woollen socks as thick and strong as are required in Alpine walking. Such are made occasionally in Scotland, and in some parts of Piedmont. He will be happy in future editions of this work to direct his readers to any shops in London where the great desiderata of Alpine boots and Alpine socks can be supplied.

Coloured flannel shirts, not of a kind liable to shrink much when washed, are the best dress to walk in, linen or cotton being kept for a change in the evening.

Grey felt hats, with moderately wide brim, are preferred by most travellers. When it is not intended to make the ascent of the higher peaks, a hat of vegetable fibre, of the kind called Panama, much lighter and giving better protection against the sun, is more agreeable.

Gloves of doe-skin, or those called in France castor, which are not spoiled by wet, are the best for mountain wear.

The Knapsack and its Contents.—In choosing a knapsack the pedestrian will probably be guided by the consideration that if he should intend to carry it himself, he will do well to reduce the weight as far as possible; while if he means to hire a guide to carry it, he need not be so careful on that head. In the latter case, and supposing him to keep to ordinary routes traversed by beaten paths, he may increase the weight to 20 or even 25 lbs., but if he intend to attempt long and difficult passes, he should avoid overburdening the guides, who besides his knapsack have to carry provisions and other necessities. In the writer's opinion the best knapsacks for mountain work are those sold in London, made of strong but light oil-cloth, without any stiffening or frame. The common defect is that the straps are not wide enough, and press too much on the shoulders. A change of outer clothing is by no means necessary, though a second pair of light trowsers is sometimes convenient. The following articles of clothing, in addition to those actually in use, he believes to be sufficient for an expedition of several weeks. One flannel shirt, three linen or cotton shirts, 1 pr. drawers, 2 pr. thick woollen socks if strong enough, 2 pr. light cotton or silk socks, 6 linen pocket handkerchiefs, considerably thicker and stronger than those generally worn, one or two extra pair of doe-skin gloves, and, lastly a waistcoat of thick knitted worsted, made with sleeves, as worn by the country people in some parts of France. This is invaluable in case of passing the night in a chalet, or bivouacking in some exposed place, weighing but a few ounces, and keeping the body very warm. Slippers are an all but indispensable luxury after a hard day's walk. Washing materials are most compactly carried in a small sheet of mackintosh with pockets for soap, brushes, &c. Those who, without being botanists, like to carry away some specimens of the beautiful

vegetation of the high Alps will add a quire, or less, of soft thick paper, and a sheet of light pasteboard of the same size. By tying them up tight with a piece of twine, small specimens will dry perfectly in the knapsack. A tin sandwich-box is very convenient for keeping together many of the small articles next enumerated, which cannot all be carried in the pockets. There will generally be one or two extra maps not in actual use, and some will add a favourite book to the contents of the knapsack.

Small Articles to be carried in the Pockets or Knapsack.

- A compass is often of great value ; it may be connected with a clinometer.
- A note-book, with a good pencil, not such as are commonly sold with it, may have a pocket to hold a passport and two or three sheets of letter paper, envelopes, court plaster, &c.
- A leather drinking cup—indispensable.
- A blue or green gauze veil, for protecting the eyes and skin when crossing snow-fields.
- A pair of blue spectacles, for the same purpose. Both should be taken.
- A strong knife, and small corkscrew.
- A light opera-glass.
- A shrill whistle, for signalling to a guide or companion, is often useful.
- Wax lucifer matches ; besides which a smoker should not omit cigar lights, which are not to be had in remote places.
- Strong twine, and a few pieces of thicker cord are often useful.
- Lipsalve, or cold cream, or glycerine, to protect the skin in long exposure at a high level.
- A little Arnica in case of wounds or bruises.
- A few Seidlitz powders or other simple medicine.
- Needles, thread, and buttons, with a little strong black ribbon.

Of the lighter articles which turn to account in the traveller's dietary, the writer recommends a small supply of tea, half a pound of dried prunes or raisins, and half a pound of chocolate. On this head tastes will differ. Many travellers carry a flask, and it is often useful, though not at all necessary. Except in certain limestone districts, good water is abundant in all mountain countries, and in long and fatiguing expeditions the guides always carry wine, which the traveller will do well to use with great moderation, and mixed with water. *Kirschwasser* and other spirituous liquors are rarely if ever useful, and at great heights do positive mischief by stimulating the circulation already over-excited. The writer has found cold tea, which may be diluted with water, or mixed with a little red wine, the best remedy against thirst.

Waterproof capes and overcoats are now made extremely light, and are easily carried, but, however useful on horseback, they are not to be recommended to pedestrians. A Scotch plaid, not too heavy, is incomparably a more useful covering. When properly worn it resists heavy rain ; it is often useful as extra covering, during a halt on a mountain top when a keen wind is blowing, or in the evening in cold quarters ; and it is no less serviceable at night when a traveller sleeps in a hay-shed, or as a substitute for the suspicious coverings of the beds in the lower order of mountain inns. The plaid is best carried strapped to the knapsack, and along with it the writer recommends a strong, but not too heavy umbrella. This is even more useful as a protection against the sun than against rain.

A strong wooden handle is far better than iron, which is often bent when exposed to gusts of wind.

Some special notice is due to the *Alpenstock*, the constant companion of the Alpine traveller. It must be owned that this article is not in the least necessary to the moderate tourist who follows beaten tracks, and it is equally true that those commonly sold in Switzerland are perfectly useless on those occasions when an effective alpenstock is required. A walking stick with an iron point to it is convenient in ascending a steep and slippery path, and in descending there is an advantage in having it longer than usual. On this understanding the ordinary alpenstock may be recommended to the ordinary tourist. The chamois horn that is often attached is positively objectionable, being likely to tear the hand in case of a slight slip. The alpenstock that is to serve a mountaineer should be made of seasoned ash, and strong enough to bear without the least sign of breakage the entire weight of the body at the middle, while the ends are supported. It should be thickest at the bottom, where it receives the point, and where it is sometimes exposed to great strain when it happens to catch in a cleft; and should taper gradually to the top where there is no risk of breakage. The point should be made of tough steel, from 3 to 4 inches in length, and not too sharp. The writer has found a decided advantage, when using the alpenstock for cutting the ice, in having the steel end made in the shape of a blunt chisel, or wedge, about three-quarters of an inch in width. The traveller who is not already provided with a trusty weapon, will do well to have the point made in England, of good steel, and to get the ash pole in the first town near the Alps, where he may halt for half a day. The steel point should have a long shank to be driven into the pole, and be secured with a substantial iron collar.

Still more essential than the alpenstock to those who wish to explore the higher regions of the Alps is the *rope*. The uses of this are noticed in the next Art. It is better to procure this in England, though a tolerable article may be had in most foreign towns. Some mountaineers use a fine sash-line. However good the material this is too slight, both because it is too quickly worn by pressure at a single point, and because it cuts the hands when used to draw up a heavy weight. Others carry ropes much too heavy, which become a positive incumbrance, and are sometimes left behind when they are wanted. The best rope that the writer has seen is made of Manilla hemp, strong enough to bear the weight of several men, yet not heavy. A length of 40 ft. is quite enough for three men. There is some convenience in having each member of a party provided with a separate short piece of rope fastened round his waist, and with an end ready to be fastened to a knot in the rope which serves as the common attachment. When this plan is adopted, some extra care is required to see that each knot is well fastened. A leather belt, with swivel spring-hook attached, is preferred by some.

The Ice-axe.—There is some difference of opinion as to the best form of ice-axe, and it would appear that a perfect weapon has not yet been invented. The traveller is not likely to provide himself until he has gained considerable experience, the task of cutting steps being usually left to the guides. The experienced mountaineer is as competent to decide the question for himself as the writer can pretend to be. He will merely remark, that in a descent over an ice-slope the chisel-pointed alpenstock, above spoken of, is a very serviceable weapon.

Crampons are irons a little wider than the foot, and attached with a leather strap, having four points turned downwards. They are sometimes convenient on a moderately steep snow-slope, when the snow is too hard to yield to the foot, but is pierced by the crampons. On hard ice or rock they are useless and disagreeable, and therefore not in favour with mountaineers. Screws of hard steel, with square four-pointed heads, and arranged in a convenient way for being driven into the soles and heels of boots, are sold by Lund in Fleet Street. These are found very useful, but in walking over rocks it is difficult to avoid knocking them out of their places.

Art. IX.—On Mountaineering.

ITS DIFFICULTIES AND DANGERS—NEEDFUL PRECAUTIONS.

All active exercises and athletic sports require a certain amount of training, in order that the muscles and senses may be used to act together. Most Englishmen acquire in early life habits of bodily activity that make mountaineering come easy to them, and what more is required must be gained by experience. A few hints may, however, not be thrown away upon beginners. The quality of sure-footedness—a mountaineer's first *desideratum*—depends upon two habits, both easily acquired: first, that of lifting the foot well from the ground, and bringing it down at once; secondly, that of observing the spot on which the foot is to rest. It is not mainly in order to choose the ground for each footstep that this is useful, though in some places it is requisite to do so; the chief advantage is that the muscles, being warned by the eye, are prepared for the precise exertion that is wanted at the moment. If aware that the next step is to be on rock worn smooth, an instinctive movement of the body is made to maintain the hold of the ground, when otherwise a slip would be inevitable. In the same way a suitable slight effort often prevents *débris* from slipping, but here the choice of the particular stone on which the foot is to rest becomes important. With habit, the slightest glance at the ground is sufficient, and the process is an almost unconscious one.

The chief use of the alpenstock is in descending over steep and rough ground. Grasping the pole in both hands, the whole weight of the body may be safely thrown upon the point, and in a few minutes it is easy to clear by a succession of leaps a distance which otherwise would require thrice the time. It is often necessary to pass at a level along the face of a very steep slope. The beginner, involuntarily shrinking from the apparent danger, is apt to lean in the opposite direction. This is a mistake, as by causing an outward thrust of the foot the risk of slipping is much increased. In all such places the body should be kept perfectly upright, and the alpenstock held in both hands ready to steady the balance, or by a bold thrust at the ascending slope to stay the movement if the foot should begin to slip. It must be recollected that, wherever the alpenstock is really wanted, it must be held in both hands. On very steep ground it is sometimes extremely difficult to avoid detaching loose fragments of rock, which may be a source of real danger to the traveller's companions. When possible, especially in a descent, it is best to take slightly different lines, so that the foremost shall not be in the way of stones sent down by the next comer. When this is

not possible, the best plan is for the party to keep close together. The risk of harm is much less when the detached stone has not acquired a dangerous velocity.

The preceding hints apply to travelling over rocks and rough ground, such as may be found in all high mountain districts. The peculiar difficulties of Alpine travelling depend upon the extent of ice and snow that cover the upper region. The ice is chiefly in the form of glaciers, whose origin and constitution are described in Art. XIII. ; the snow, except after a recent fall, is in that peculiar condition called *névé*. In ascending the Alps, the traveller usually begins his acquaintance with the ice region by traversing a greater or less extent of glacier ; if he continue to ascend, he will reach the *névé*, and it may easily happen that, at a still greater height, he will find the surface covered with a layer of fresh snow. The surface of a glacier is sometimes very even and slightly inclined, sometimes steep and irregular, being cut up by deep rents called crevasses, which may vary from a few inches to many feet in width. When the sun has shone for even a short time upon the glacier, the upper layer of ice partially melts, leaving a crisp and crumbling surface, on which the foot holds very well ; but after rain, and before sunrise, the ice generally shows a hard and very slippery surface ; the foot, though shod with steel points, makes scarcely any impression, and it is necessary to cut steps with much labour on slopes that a few hours later may be crossed with ease. The lower portion of a glacier, below the point where the ice is covered with *névé*, is quite as easy and safe to traverse as if it were formed of rock instead of ice. Reasonable caution is needed in jumping over crevasses, but there is no more reason why a traveller should fall into them than that he should walk over the edge of a chalk cliff on the South Downs.

Above the limit of the *névé* the obstacles that stand in the way of the mountaineer may properly be called dangers rather than difficulties, and are discussed below under that head.

In the ascent of the higher peaks of the Alps, the pleasure and excitement are not unalloyed by some inconveniences. The first of these is *thirst*, painfully felt by those who are not used to such expeditions. In this, as in other matters, prevention is better than cure. The practice of carrying a small quartz pebble in the mouth has been ridiculed, but it rests upon a rational foundation. By causing an involuntary movement of the jaws it stimulates the salivary glands, and keeps the mouth moist. In cases where this means of prevention is insufficient, dried prunes or raisins are to be recommended ; they are far more serviceable than drinking. The fruit should be kept in the mouth as long as possible, and chewed very slowly during the ascent. As a drink along with food, cold tea diluted is the best remedy for thirst.

Another source of inconvenience is the *heat of the sun* upon the head. A thermometer exposed upon a black felt hat has risen to 151° Fahr. It is only surprising that the consequences are not more serious to the wearer. A layer of cotton wadding tied round and over the hat gives some protection. At the risk of appearing eccentric, the writer has found relief from carrying an umbrella over the snow-fields.

More serious than either of the above is the painful affection sometimes called *mountain-sickness*. This appears to be due to the combined effects of

unusual exertion and the diminished density of the air at great heights. The first effect is to cause difficulty of breathing, a great indisposition to exertion, headache, drowsiness, and, if continued, nausea and loss of appetite. The writer believes that there is no instance of persons suffering from this affection who have accustomed themselves to breathe the air at a not very much lower level. Persons used to active exertion at a height of 11,000 or 12,000 feet are not liable to mountain-sickness in ascending any of the peaks of the Alps. As it is impossible to struggle effectually against the complaint, the only plan is to meet it by patience and perseverance. The use of strong liquor, as a restorative, should be carefully avoided. It may be necessary to halt every twenty paces, or even at shorter intervals, till the symptoms abate. As it rarely attacks travellers till they are near the goal of their exertions, it is only necessary to take time enough to overcome it. The best proof that unusual exertion is the chief cause of the symptoms is the fact that they are never felt in descending, even from the highest summits. Although habit diminishes very much the evil effects, there is little doubt that all mountaineers are, more or less, affected by the mechanical and physiological disadvantages that attend muscular exertion at a great height. If the time be noted that is required to ascend two snow-slopes of equal height and steepness, but at very different elevations, it will be seen that much more time is consumed at an elevation exceeding 13,000 ft. than is required at 9,000 or 10,000.

Long exposure to the glare of the snow, especially in sunshine, is very apt to cause *inflammation* either of the eyes themselves, or of the surrounding membranes. The precaution of wearing dark spectacles, or a gauze veil, or both together, should be adopted in time, without waiting till disagreeable sensations are felt. These show that the inflammatory action has begun. The consequences of neglecting these precautions are sometimes extremely painful. The best remedy is to apply a cloth or handkerchief, steeped in water, closely pressed upon the inflamed eyelids, and frequently renewed until the symptoms abate.

This list of minor miseries of mountaineering may be closed with one which is often felt for some days after an ascent, though but little at the moment. This is the *blistering and peeling off of the skin*, caused by the direct rays of the sun, or the reflection from the snow, aided by the sharp wind which usually blows at great heights. After a long day's exposure at a great height it often happens that every portion of the outer skin exposed to the air peels off, leaving the surface raw and uncomfortable for several days. Cold cream or glycerine applied beforehand is a preventive, and the veil acts as a partial protection. The lips are the part that most frequently suffers from this cause, being sometimes split in a painful manner. Collodion, although a disagreeable application, is sometimes useful by forming a pellicle over the surface which excludes the air. Some prefer a calico mask to a veil.

Blisters in the soles of the feet should not be cut, but pierced with a needle near the edge, and the contents pressed out. Some persons are apt to lose the skin of the toes during a long and steep descent. This is easily replaced by good adhesive plaister. A French article, called Taffetas Boggio, is decidedly superior to most English court-plaister.

Precautions for Health.—Few of these are required, for the combination of

active exercise, pure air, and freedom from care, that is found in the life of the Alps, is better for the health than all the prescriptions yet framed by doctors. A few hints may not be useless.

Avoid overworking yourself at first.

When fatigued after an unusually hard day's work, avoid wine, and drink weak tea in the evening. You will sleep soundly and awake refreshed.

Should you still feel the effects of over-fatigue, make the following day one of rest.

Make it an invariable rule to wash extensively with cold water, and change your inner clothing immediately on your arrival after a day's walk.

Dietary.—In some parts of the Alps, in the Bernese Oberland, and about Chamouni, it is quite safe to rely on obtaining food at the places where a traveller puts up for the night. In other districts, where the supplies are poor and scanty, it is necessary to carry supplies, more or less extensive, according to the wants of each traveller. The writer has found 1 lb. of rice per day, thoroughly boiled in the excellent milk which is always to be had at the upper châteaux, quite sufficient to give two good meals to two travellers. Chocolate may be used for one meal, but in that case bread should also be taken. Hard-boiled eggs contain much nourishment in small space. They are usually boiled too hard; five minutes is quite enough, but even so they are not very attractive food. The only bread commonly found in châteaux is a hard black bread, baked once or twice a year, and not agreeable to unaccustomed palates. On the Italian side of the Alps a substitute for bread is often found in the shape of *polenta*, made of the maize flour. When the flour is good and thoroughly cooked, this, eaten with fresh butter, is wholesome and palatable food. The *brousse* made in the cheese châteaux in many parts of the Alps is highly recommended by some, but does not suit all stomachs.

The travellers who have explored many of the wilder and least accessible parts of the Alps, where the want of wholesome food is a serious impediment to a prolonged stay, do not seem as yet to have used the supplies which are now to be had in most of the great cities of Europe. It is well known that excellent meat, well cooked, with or without vegetables, is prepared in hermetically sealed tin cases, and such cases have been largely supplied to exploring expeditions. In some parts of the Alps there may be a little practical difficulty in conveying considerable supplies in this form, but it may be useful to point out that, as nearly all the valleys of the Piedmontese Alps are accessible in a few hours from Turin, there can be no great difficulty in conveying a few tin cases of cooked meat to any required point on that side of the main chain. Very good articles are supplied at the establishment of Fratelli Lancia, Piazza del Palazzo di Città, Turin. The price of a case containing 1 kilogramme—more than 2 lbs.—of beef or veal, is about 5 francs, and for half that quantity, 3 francs. Their *bœuf à la mode*, *bœuf aux fines herbes*, and *bœuf à la financière*, are highly commended. Those who wish to indulge in luxurious living in the Alps, may order larger cases, containing stuffed capon, or other elaborate dishes.

In taking food for a long day's excursion, cold roast meat is generally the best. The guides are disposed to take more than is really wanted, yet, as they consult their own tastes more than that of their employers, it is well to

look sharply to the choice that is made. It is a good plan to scoop a hollow in each roll or loaf of bread, and introduce a lump of fresh butter, closing the opening with bread. Butter is always welcome at a great height, and is very useful against thirst. The same remark applies to honey. Chocolate and dried prunes are desirable articles as a reserve in case of need.

Sleeping Bag.—Travellers who shrink from the bad quarters often encountered in the higher valleys of Piedmont and Savoy, and the still worse abominations of Dauphiné, may follow a fashion lately introduced to the Alps from the Pyrenees, where such articles have long been in use, and make themselves independent of lodging by means of a sleeping bag. Various patterns have been tried, varying in weight from 7 lbs. to more than double as much. The best arrangement seems to be that described by Mr. F. F. Tuckett in the first number of the 'Alpine Journal.' The bag described by him, which weighs about $8\frac{1}{2}$ lbs., and costs 3*l.* 8*s.* 6*d.*, is made of a thick sort of blanketing, called swan-skin, partly covered with mackintosh, in addition to which is a mackintosh sheet, which may be used to cover the sleeper or his guides. Mr. Tuckett, who passed a night in this bag on the peak of Monte Viso, justly remarks that to sleep at so great a height, and in so exposed a situation, is rather too severe a trial for the guides, only excusable in the case of those who turn their excursions to account for the progress of science. This objection does not exist to a bivouac where wood for firing is attainable.

The dangers of Alpine travelling have been often exaggerated, but they are real, and no rational man will disregard them. The best proof that these dangers are not greater than those attending many other active exercises, such as fox-hunting and yachting, is the fact that, in spite of inexperience and the neglect of the best known precautions, the fatal accidents in the Alps have been so few. The loss of six lives within the last four years, and a much larger number of very narrow escapes, some of them happening to first-rate guides and mountaineers, ought, however, to operate as a salutary warning. The wives and mothers of Alpine travellers, who are made uneasy by the reports of accidents, should know that none have yet occurred that would not have been certainly prevented by adherence to well-known rules; and, instead of endeavouring to withhold their husbands and sons from a healthful and invigorating pursuit, should simply urge them not to disregard precautions which afford absolute security against all its ordinary dangers. The following remarks are condensed, with slight alterations, from a paper by the present writer, the 18th chapter of the first series of 'Peaks, Passes, and Glaciers.'

The dangers of Alpine expeditions may be divided into two classes—the real and the imaginary. Where a ridge or slope of rock or ice is such that it could be traversed without difficulty if it lay but a few feet above the level of a garden, the substitution on either side of a precipice some thousands of feet in depth, or of a glacier crevasse, makes no real difference in the work to be done, though it may have a formidable effect on the traveller's imagination. Those who cannot remove this source of danger by accustoming themselves to look unmoved down vertical precipices, and, in cases of real difficulty, to fix their attention exclusively on the ledge or jutting crag to which they must cling with foot or hand, should avoid expeditions where a moment's nervousness may endanger their own lives or those of others.

The real dangers of the high Alps may, under ordinary circumstances, be reduced to three. First, the yielding of the snow bridges that cover glacier crevasses; second, the risk of slipping upon steep slopes of hard ice; third, the fall of ice or rocks from above.

From the first and most frequent source of danger absolute security is obtained by a precaution generally known, but often neglected. In the higher region of the glaciers, crevasses, even of considerable width, are often completely bridged over by a covering of snow or *névé*, so that no indication of their existence is seen on the surface of the glacier. The bridges, especially when formed of fresh snow, often yield under the weight of a man's footsteps; in such a case an active man whose attention is on the alert may sometimes extricate himself at once, but it more commonly happens that he falls into the chasm beneath, in which case his chance of life is faint indeed. But if several travellers are tied together with a stout rope, as it is in the highest degree improbable that a majority of them should fall at the same moment into the same crevasse, no appreciable danger from this cause need be incurred. Even two travellers tied together may with a proper attention avoid this risk, but greater security is obtained when they are three or more in number. It is mainly because he cannot be protected from this danger that a man who goes alone over the higher regions of the great glaciers incurs a risk that must be called unjustifiable.

As it is hard to persuade a landsman that a well-found yacht has more danger to fear in a fog, with a smooth sea around, than when a stiff breeze is blowing, so few mountaineers are willing to admit that there is more real chance of accident in traversing some wide expanse of *névé*, unbroken by a single ruffle, than in crossing a broken glacier with wide crevasses opening on every side. A very moderate amount of practice enables a man to make sure of his footing and to avoid seen dangers, but unseen perils call forth no caution, and though the rope offers complete security, few travellers yet understand that it should form a part of their regular equipment. At the risk of being thought overcautious, the writer will not cease to urge upon his fellow-travellers in the Alps the enactment, as a fixed rule in mountaineering, that on reaching the limit of the *névé* the members of a party should all be roped together. He is perfectly aware that there are many places where the risk is very slight: a practised mountaineer might cross the Théodule Pass 500 times without accident, but the 501st time he might be lost in a crevasse, as has happened twice on or near the pass since the writer first knew it. With a sufficient inducement, and if it were impossible to find a companion, he would not hesitate to cross that or some other high pass alone, but if he were in company he would insist on the use of the rope.

It would seem scarcely necessary to add that the rope should be sound and strong, if it did not often happen that untrustworthy articles are taken by guides; and it is not less important to note that it should be fastened round the body of each member of the party, *guides included*, leaving both hands free to use the alpenstock in case of a slip. A neglect of this obvious rule led, in 1860, to the loss of three English travellers, and one of their guides, in the descent from the Col du Géant to Courmayeur.

When it is a matter of importance to cross a snow bridge of doubtful solidity, it is a good plan to let each person in succession crawl across on hands and knees, with the alpenstock in one hand laid flat upon the snow,

so as to distribute the weight over as large a surface as possible. It is needless to say that, as a matter of course, the whole party should be well roped together.

The ascent and descent of steep ice-slopes are amongst the most difficult operations that commonly fall in the way of the mountaineer, but when properly conducted there should be little or no danger to those concerned. It should be explained that the term ice-slope is commonly applied to slopes of *névé* on which, after a certain amount of exposure, a crust is formed, too hard to yield to the foot, yet very different from compact glacier ice. This icy crust yields easily to the axe, and a couple of well-directed blows suffice to make a step on which the foot may take secure hold. When we read of ascents in which several hundred steps have been cut, it must usually be understood that these have been made on slopes of frozen *névé*. Though the operation is rather tedious, and fatiguing to those engaged in cutting the steps, such ascents seldom involve any risk, for the steps are usually very easily enlarged so as to give good standing ground. On slopes exposed to the sun, where a thin layer of snow has lain over rocks, the whole mass is sometimes so saturated by the melting of the surface that when refrozen at night it is converted into a continuous mass of nearly compact solid ice. Such a slope, especially if it be steep, is far more troublesome than those above described; to cut steps is a much more laborious operation, and these are generally much shallower, so that they give but precarious footing. None but men who have acquired the requisite steadiness ought to attempt the ascent, or, what is more difficult, the descent over such a slope.

In spite of every precaution, a traveller may slip on an ice-slope where, if unchecked, a fall would lead to certain destruction. Against this danger the rope is usually an effectual preservative. Cases are said to occur where the footing is so precarious that a party cannot be tied together, as, if one were to slip, he would inevitably drag all his companions along with him to destruction. It is for those concerned to consider whether in such instances the object in view is such as to justify the inevitable peril of the ascent. The writer confesses that he is somewhat sceptical on this point, and he doubts whether there be any slopes that have yet been surmounted where two men, well used to the business, could not hold up a third who might slip, especially if the latter be not wanting in steadiness and presence of mind.

There is one description of slope which usually involves serious risk. That is when a layer of fresh snow lies upon a surface of hard ice, or even well-compacted *névé*. For some days there is little adhesion between the upper and the under layer, and if the slope be steep the disturbance caused by the pressure of a foot may easily produce an avalanche capable of carrying away and burying an entire party. Practical experience is needed to determine whether the ascent can be safely attempted. The only fatal accident recorded in the numerous ascents of Mont Blanc arose from the travellers insisting on persevering, against the judgement of the guides, when the snow was in this condition.

The dangers arising from masses of snow or rock falling across the track are at the moment beyond the skill of the traveller, but they may, to a great extent, be avoided by a judicious choice of route. Experienced mountaineers learn to recognise the positions where ice detached from a higher level descends over a precipice or steep slope of rock. They either

avoid such spots altogether, or are careful to pass them early in the morning, before the sun has loosened the impending masses, or late in the day, after his rays have been withdrawn.

During bad weather the ordinary risks of Alpine travelling are much increased, and serious dangers from other causes may assail the traveller. Masses of rock are detached from their previously firm resting-places, and come thundering down across the track. Falling snow obscures the view and effaces the foot-prints, so that it becomes equally difficult to advance and to retreat. Most formidable of all, the *tourmente*, or snow whirlwind—when the wind begins to blow in violent gusts—bewilders the traveller, half blinded by the fine dust-like snow of the higher regions, and benumbs his limbs with its biting breath if he be unable to keep up rapid exercise. A reasonable man will not attempt expeditions in the higher region of the Alps during bad weather, and will resort to an immediate retreat when unexpectedly attacked by it. Attention to the bearings of the compass and to landmarks, when the appearance of the weather becomes doubtful, will enable travellers to retrace their steps. In attempting to traverse an unknown glacier, it is a very useful precaution to gain some commanding point overlooking the projected route, and examine the surface carefully through a glass. In this way mistakes are often avoided, and time saved.

Art. X.—Climate and Vegetation of the Alps.

CHÂLET-LIFE IN THE ALPS.

The narrow limits of this Introduction admit of but a brief reference to a subject which it is difficult to treat without entering into some detail. The climate of the Alps determines the character of the vegetation, and upon this depend the occupations and manner of life of the inhabitants. Writers upon this subject have attached too much importance to the absolute height above the sea-level, as though this had a predominant influence upon the climate, whereas the position of each locality in respect to the great mountain masses, and the local conditions of exposure to the sun and protection from cold winds, or the reverse, are of primary importance in deciding the climate and the vegetation.

Olive Region.—Along the southern base of the Alps we find a first illustration of the remark above made. The climate of the lower declivities and the mouths of the valleys is markedly warmer than that of the plains of Piedmont and Lombardy. While the winter climate of Milan is colder than that of Edinburgh, the olive ripens its fruit along the skirts of the mountain region, and penetrates to a certain distance towards the interior of the chain along the lakes and the wider valleys of the Southern Alps. The olive has even become wild on the shores of the lake of Garda, where the evergreen oak is indigenous, and lemons are grown on a large scale, with partial protection, during the winter. The climate of the Borromean islands and some points on the shores of the Lago Maggiore is known to permit the growth of many plants of the warmer temperate zone, while at a distance of a few miles, and close to the shores of the same lake, but in positions exposed to the cold winds from the Alps, plants of the Alpine region grow freely, and no delicate perennials can survive the winter. Accurate

information is wanting as to the temperature of this region. The olive has been known to resist a temperature of -9° Cent., or about 16° Fahr., but is generally destroyed by a less degree of cold. Its successful cultivation may be held to indicate a winter in which frosts are neither long nor severe, where the mean temperature of winter does not fall below 42° Fahr., and a heat of at least 75° Fahr. during the day is continued through four or five months of the summer and autumn.

Vine Region.—The vine is far more tolerant of cold than the olive, and will produce fruit with a much lower summer temperature, but to give tolerable wine it demands, at the season of the ripening of the grape, a degree of heat not much below that needed by the olive. These conditions are satisfied throughout a great part of the Alpine chain in the deeper valleys, and in favourable situations up to a considerable height on their northern slopes. While the olive region is but exceptionally represented on the S. side, the vine not only extends to form a girdle round the entire region, but reaches near to the very foot of the greater peaks. The fitness of a particular spot for the production of wine depends far more on the direction of the valley, and of the prevailing winds, than on its height. Hence it happens that in the Canton Valais, the valley of the Arc in Savoy, and some others on the N. side of the dividing range, tolerable wine is made at a higher level than in the valleys of Lombardy, whose direction allows the free passage of the keen northern blasts. It is not uncommon to see vineyards rising in terraces on the N. slope, exposed to the full force of the sun, while on the opposite declivity the pine descends to the level of the valley. The vine in the Alps often resists a winter temperature which would kill it down to the roots in the low country, doubtless because of the protection afforded by the deep winter snow. An early thaw followed by spring frosts often injures the crop. A mean summer temperature of 68° Fahr. is considered necessary to produce tolerable wine, but in most of the places where the vine is grown in the Alps the heat rises, at least occasionally, much beyond the required limit. In fine weather the thermometer often stands at and above 80° Fahr. in the shade in the valleys. Along with the vine many species of wild plants, especially annuals, characteristic of the flora of the S. of Europe, show themselves in the valleys of the Alps.

The Mountain Region, or Region of Deciduous Trees.—Many writers take the growth of corn as the characteristic of the colder temperate zone, corresponding to what has been called the mountain region of the Alps. But so many varieties of all the common species, with widely different requirements, are in cultivation, that it is impossible to identify the growth of cereals in general with any natural division of the surface. A more natural limit is marked by the presence of the principal deciduous trees. Although the oak, beech, and ash do not reach exactly the same height, and are not often, if anywhere, present together in the Alps, their upper limit corresponds accurately enough to that transition from a temperate to a colder climate, that is shown by a general change in the wild herbaceous vegetation. The lower limit of this district is, as we have seen, too irregular to admit of definition; its upper boundary, marked by the gradual disappearance of the above-mentioned trees, is at about 4,000 ft. on the N. side of the Alps, and often rises to 5,500 ft. on the southern slopes. It would be a mistake to suppose that the aspect of this region is mainly characterised by its tree

vegetation. The climate appears to be favourable to one or other of the trees which have been named as marking its limits, but the interference of man has done much to eradicate them. It is probable that at a very early date they were extensively destroyed for use in building, and to clear space for meadow and pasture land, so that, if we except the beech forests of the Austrian Alps, there is scarcely a considerable wood of deciduous trees to be seen anywhere in the chain. In many districts, where population is not too dense, the pine and Scotch fir have taken the place of the oak and beech, mainly because the young plants are not so eagerly attacked by goats, the great destroyers of tree vegetation. On the S. side of the Alps, the chestnut, although naturally an inhabitant of a warmer region, has in many districts replaced the other deciduous tree, rising to within 1,000 ft. of the same height, being met by the pine, which descends through the intermediate space. To this region belong many of the lower ranges on the outskirts of the Alpine chain, and some highland pastoral districts, such as those of the Beauges in Savoy, of the Swiss Canton of Appenzell, and the plateaux of the Venetian Alps between the Adige and the Piave. We find here one form of the peculiar condition of society characteristic of the Alpine highlands, but this is more conveniently described in connection with the next region. The annual mean temperature of this region is not very different from that of the British Islands, but the climatal conditions are as different as possible. Here snow lies for several months together, till it disappears rapidly in a few weeks of warm spring weather, and gives place to a summer considerably warmer than the average of our seasons.

The Subalpine Region, or Region of Coniferous Trees.—This is the region which mainly determines the manner of life of the population of the Alps. On a rough estimate of the region lying between the summits of the Alps and the plain country that encircles them, we may reckon the whole amount of land in cultivation at about one-quarter of the surface, and of which but little more than a half is under vineyards or cornfields, and the remainder produces forage and artificial meadow. Nearly another quarter of the whole region may be set down as utterly barren, being formed of snow-fields, glaciers, bare rock, lakes, and the beds of streams, leaving about one-half of the entire surface which is divided between forest and grass land, either natural meadow or pasture. These proportions show clearly that if any considerable population is to derive a subsistence from the soil, it must be from feeding animals, and not from the direct production of human food. It is principally from the subalpine region that these animals draw their support. Grass land is, indeed, abundant in some parts of the mountain region, but it is chiefly reserved for hay, while the upper pastures of the subalpine and Alpine regions support the herds and flocks during the fine season. Botanically this region is best distinguished by the prevalence of coniferous trees, forming vast forests that, if not kept down by man, and by the tooth of the goat, would cover the slopes of the Alps. The prevalent species are the common and the silver fir. In granitic districts the larch flourishes, and reaches a greater size than any other tree. Less common are the Scotch fir and the arolla or Siberian fir. In the Eastern Alps the mughus, dwarf-pine, or *kieholz* of the Germans, becomes conspicuous, forming a distinct zone on the higher mountains, above the level of its congeners. The pine forests play a most important part in the

natural economy of the Alps, and their preservation is a matter of vital consequence to the future inhabitants. Through ignorance or recklessness the destruction of the forests has in some districts been carried much too far; for the present gain derived from the sale of the timber, and the additional space gained for pasture, may be dearly purchased by future sterility. In the Northern Alps the coniferous trees scarcely attain to a height of 6,000 ft., while on the S. side they often reach 7,000 ft. The larch, the arolla, and the mughus are the species that ascend highest, not uncommonly surpassing the above limit. As it is principally to be seen in this region, we shall here briefly notice what may be termed the *châlet*-life of the Alps, without attempting to describe its various forms in detail.

The entire space occupied by the Alps is mainly composed of deep valleys enclosed between steep and high mountains. The land fit to produce human food being scattered in comparatively small strips and patches in the valleys, while a large part of the mountain country can support during half the year cattle that must be housed and fed in the valleys in the winter, a large part of the population leads a nomad life, changing their habitations several times in the year. According to varying circumstances, such as the extent of land held in tillage, the demand for labour in other occupations, and the traditional usage of the district, the migration may extend to nearly the entire population, or only to a small number strictly necessary for the care of the animals. In the month of May the horned cattle, that have been fed in houses through the winter, are led up to the lower pastures, where tolerably substantial houses are generally found. In the French Alps the general name for all houses used by the people employed in tending cattle is *Châlet*, and this has been commonly applied both by French and English writers to all the small temporary habitations in the upper region of the Alps. The German term is *Sennhütte*. In Italy various names are current in different districts, of which the commonest are *Casera* or *Casara*, and *Malga* or *Malgheria*. The lower *châlets*, occupied in May and the first half of June, generally stand at about the upper limit of the mountain region, or the lower part of the subalpine region. When they are superior in construction to the mere huts which serve in some districts, they are commonly called *maïensässe*, or *mayens*.

Towards the middle, but sometimes not till the end, of June, the cattle are moved up to the chief pastures, usually towards the upper part of the subalpine region, where they are intended to remain for the ensuing two or three months. Where available pastures are to be had still higher up in the Alpine region, a portion of the cattle are sent there for a time varying from four to eight weeks. In most parts of the Alps the making of cheese is the chief employment of the men who tend and milk the cattle. The quantity produced must be enormous. In Switzerland cheese forms a large part of the dietary of the people, and the export is valued at 350,000*l*. The quality of the cheese produced in the Eastern Alps is far superior to that of Switzerland. Butter is made on comparatively a small scale, and although the people are such proficient in cheese-making, the art of making good butter seems to be little known anywhere in the Alps.

The actual care of the cattle forms but a small part of the labours of the Alpine peasantry. The true limit to the wealth of a commune or a family, which is expressed by the number of cows it can keep, does not depend in

general upon the amount of pasturage that can be found for them in summer, but on the quantity of food that can be stored up for them in winter, and to this task the labour of a large part of the population is directed. Besides artificial meadow in the valleys, the best grass land in the mountain region is kept to be cut for hay; and, when it can be spared, a further share of the upper pasture is reserved in the same way. Besides this, men and boys are constantly engaged during the summer in robbing of their natural vegetation the least accessible spots of the mountains, where the cattle cannot arrive. A day's work is often consumed in collecting a small bundle of grass, gathered from ledges that are reached by perilous climbing, and brought down in a cloth balanced on the head, to add to the store of hay for the coming winter.

A stranger in the Alps is often misled by the large number of huts or wooden sheds seen on the slopes of the mountains, and supposed to be intended for dwellings. Two-thirds, or a larger proportion, of these are hay-sheds, and, as a general rule, one or two such sheds are found close to every chalet except those in the highest region. This arrangement is a great convenience to travellers who pass the night at a chalet, as the hay, if not damp, makes a much better bed than can be had in the narrow shed where the herdsmen are constantly engaged.

The Alpine Region.—In defiance of etymology, which would make the term Alpine coextensive with the entire tract available for pasturing cattle, this epithet has been attached by writers of authority to the zone of vegetation extending between the upper limit of trees and the first appearance of permanent masses of snow. Shrubs are not wanting throughout this region. The common rhododendron, several small species of Alpine willow, and the common juniper extend up to, the latter even beyond, the level of perpetual snow. It is in this region that the botanist finds fully developed the peculiar vegetation characteristic of the Alps. Many species may, indeed, be found here and there at lower levels, either accidentally transported from their natural home, or finding a permanent refuge in some cool spot sheltered from the sun, and moistened by streamlets descending from the snow region; but it is here that the varied species of saxifrage, primrose, pedicularis, anemone, gentian, and other genera, that give to the Alpine flora its utmost brilliancy of hue, have their peculiar home. In valleys where pasturage is scarce, the inhabitants are forced to send their cattle up to the very limit of vegetation in order to support them during the summer, while the grass of the subalpine region is in great part turned into hay for winter use. In such cases one or two men remain for several weeks on some isolated slope of Alpine pasture, many hours' walk from the nearest village, until the day arrives when the cattle are led back, perhaps across a glacier, or by some very difficult track, to the lower chalet which serves as an intermediate station between their summer and winter quarters. In other parts of the Alps, where sheep and goats are more common, the pastures of the higher region are left exclusively to them. The limits of this region in the Northern Alps may be fixed between 6,000 to 8,000 ft. above the sea, and at least 1,000 ft. higher on the S. slopes of the Alps and in some parts of the main chain. In Piedmont it is not uncommon to find chalets at 8,500 ft. above the sea-level, and vegetation often extends freely up to 9,500 ft.

The Glacial Regions.—This comprehends all that portion of the Alps that rises above the limit of perpetual snow. We continue to use that term, which is convenient and cannot well be replaced, but without explanation it is apt to mislead.

Since the mean temperature becomes constantly lower as we ascend towards the higher peaks, there must be some point at which more snow falls in each year than is melted, or carried off by the wind, or otherwise removed. It is found that, one year with another, this occurs at pretty nearly the same point, and that the same patches or fields of snow are found to cover the same slope of the mountain. But we never find, unless after fresh snow, that the entire surface of a mountain above a certain height is covered with a continuous sheet of snow. The form of the surface causes more snow to rest on some parts than upon others; the prevalent winds blow away the freshly-fallen snow from the exposed ridges, and cause it to drift in the hollows, and the sun acts with great force, even on the highest peaks, upon the slopes fully exposed to his rays. The consequence is, that portions of the surface remain bare at heights greatly exceeding the so-called limit of perpetual snow; and that limit is far from retaining a constant elevation throughout the Alps, or even on opposite sides of the same mountain. The term, nevertheless, has a definite meaning when rightly understood. Leaving out of account masses of snow that casually accumulate in hollows shaded from the sun, the formation of permanent snow-fields takes place at about the same height when the conditions are similar. Hence it happens that, on viewing an Alpine range from a distance, the larger patches and fields of snow on adjoining mountains, with the same aspect, are seen to maintain a pretty constant level. Vegetation becomes scarce in this region, not, as commonly supposed, because Alpine plants do not here find the necessary conditions for growth, but simply for want of soil. The intense heat of the direct rays of the sun compensates for the cold of the nights, and it is probable that the greater allowance of light also stimulates the processes of vegetation. But all the more level parts are covered with ice or snow, and the higher we ascend, the less of the surface remains bare, with the exception of projecting masses of rock, which usually undergo rapid disintegration from the freezing of whatever water finds its way into the superficial fissures. Many species of flowering plants have been found at a height of 11,000 ft., and even above 12,000 ft. As only a thin covering of snow can rest upon rocks that lie at an angle exceeding 60°, and this is soon removed by the wind or melted by the sun, some portions of rock remain bare even at the greatest height attained by the peaks of the Alps. There is, indeed, reason to believe that the quantity of snow falling on the higher summits is very much less than falls a few thousand feet lower down.

Art. XI.—Alpine Zoology.*

The zoology of the Alps is replete with many points of interest. Although some of the more remarkable animals have passed away; although the gigantic urus (*Bos primigenius*), which flourished in the forests of Mid-Switzerland during the prehistoric human period, and gave its name to the Canton of Uri, is now extinct; although the marsh-hog, which survived in

* By C. Carter Blake, Esq.

the lake-habitations (*Sus Scrofa palustris*), exists no longer, having given place to the modified wild boar and domestic hog, which afford sport and food to the present population, the mountains at a higher elevation, and far above the snow-line, afford examples of an Alpine fauna, which, as might *à priori* have been expected, represents in many important points the fauna of other and still less accessible regions. We purpose briefly to recapitulate the more striking forms, and to comment on their vertical distribution.

The human species in Switzerland does not afford any marked deviation from the ordinary type. The time is long gone by when a zoologist could, as Linnæus did, point to the *crétin* of the Alps as an example of a monstrous variety of man. The human skulls found in the Pfahlbauten of Switzerland do not essentially differ from the existing Swiss forms. But at La Tinière, according to the testimony of M. Morlot, a human skeleton has been discovered, which exhibits the small, round, 'brachycephalic' type of skull, akin to those of the 'stone period' of Denmark.

The order *Carnivora* is well represented in Switzerland. The lynx (*Felis Lynx*) and the wild cat (*F. Catus*) are to be found at high elevations in the Alps. The former, in the Pyrenees, reaches the vertical height of 11,300 ft.; its 'bathymetrical' distribution in the Alps is unrecorded. Up to a thousand feet are found the marten (*Martes foina*), the weasel (*Putorius vulgaris*), and the polecat (*Putorius fætidus*). The stoat, or ermine, reaches a higher elevation than any other Alpine carnivore; it is found at the height of 10,000 ft. Next beneath it, at 9,000 ft., lives the brown bear (*Ursus arctos*). The means which would enable the zoologist confidently to decide whether the bear of the Alps (*U. Arctos*) and the Pyrenean bear (*Ursus pyrenaicus*) are really distinct species, as was alleged many years ago by Frédéric Cuvier, are wanting, and it is to be hoped that some traveller will bring over a complete series of skulls, old and young, male and female, of the Pyrenean bear, which will at once solve this question.

The order *Ruminantia* exhibits many interesting examples. In the whole world, the Alps, the Pyrenees, the Carpathians, and Albanian mountains, are the sole spots where the chamois or gems (*Rupicapra Tragus*) still survives, almost the solitary representative of the antelopine genus in Europe. The chamois ranges to an elevation of 12,000 ft. It has so long been selected as the representative of the Alpine fauna, that any comment on the most striking and picturesque animal of Switzerland will be superfluous. The goats of the Alps are represented by the common domestic goat (*Hircus Ægagrus*) and the ibex, bouquetin, or steinbock (*Capra Ibez*). The horns of the male bouquetin are strong, thick, subquadrangular, and frequently extend to a length of several feet; those of the female are much smaller. The bouquetin is stated to be identical with the ibex of Pliny, and the αἰγες ἄγριοι ἐν Αἰβύῃ of Ælian. However this may be, there is little doubt that the bouquetin is rapidly becoming extinct, and that there will soon be very few examples left of a species which was probably once common, as it has left its remains in the Swiss lake-habitations. An allied example of wild goat is found in the Pyrenees, the Pyrenean tur (*Egoceros pyrenaica*), where it is the representative of the Alpine bouquetin. The breeds of sheep and oxen in Switzerland do not essentially differ from those of Central Europe, the nature of the soil necessarily precluding the extensive distribution of sheep in the highlands. The deer of Switzerland are

also the South German forms, the red deer (*Cervus Elaphus*), the fallow deer (*Dama vulgaris*), and the roebuck (*Cupreoius Capræa*). None of them range nearly to so high an elevation in the Alps as the chamois or the ibex, whose firmer feet and coarser digestive apparatus enable them to ascend to higher vertical zones, and to subsist on a less nutritive diet than the solid-horned cervine ruminants. The hog of Switzerland is the wild boar of France and Germany; the marsh-hog, whose flesh was eaten by the men who built the Pfahlbauten, having long since passed away. The horses and asses of the Alps are most usually seen under the form of the common hybrid, or mule, which alone is sufficiently strong and sure-footed for the difficult tracks.

The *Cheiroptera*, or bats, of the Alps are confined chiefly to the mountains of inferior height, and do not ascend above the snow-line. The ordinary continental bat (*Vespertilio murinus*), the noctula (*V. proterus*), the barbastelle (*Plecotus Barbastellus*), the small horse-shoe bat (*Rhinolophus hipposideros*), the great horse-shoe bat (*Rhinolophus ferrum equinum*), the *Vespertilio Nattereri*, and the large-eared bat (*Plecotus auritus*), are typical of the Alpine fauna. Other species have been stated to be found, but, according to Tschudi, they are of less frequent occurrence.

The Alpine *Insectivora* are all of characteristically European type. The hedgehog (*Erinaceus europæus*), the land-shrew (*Sorex araneus*), and the water-shrew (*Sorex fodiens*) are Alpine forms. The white-tailed shrew (*Sorex leucodon*), a beautiful species, of which the back is reddish-brown and the belly white, is also frequently found. Besides these, the mole (*Talpa europæa*) is common, and it is even found in places like the valley of Urseren, surrounded on every side by rocky ground, where the animal cannot subsist. The reasons which have led to the isolation of some of these individual forms are unknown, and the presence of the mole in these valleys is inexplicable on the supposition of their migration from other localities during the present topographical conditions of the soil.

The *Rodentia* of the Alps are not numerous. The marmot (*Arctomys Marmota*) is to be found in its small burrows over the whole of the Alps, where it is persecuted by the hunters, who eat the flesh and use the fat as a remedial agent, which is sold at a high price. Kircher considered the marmot to be descended from the badger and the squirrel, as the armadillo was believed to be the offspring of the hedgehog and the tortoise. Several species of campagnol (*Hypudæus alpinus*, Wag., *H. Nageri*, *H. rufescentefuscus*) are to be found in the Alps, of which the specific distinction is not yet clearly made out. Wagner describes a species named *Hypudæus petrophilus*, from Allgau; another, found in the French Alps, is termed *Arvicola leucurus*. The *Lepus variabilis*, or *alpestris*, is also found in the Alps: the same species extends from the 55th parallel in the eastern hemisphere northward to the Arctic circle.

ALPINE BIRDS.—The number of birds known in the Alps is very great. One hundred and thirty-nine species occur, being one-half of all the birds, residents or passengers, which occur in Central Europe. Even water-birds are to be found—the goose, duck, grebe, and gull. The grallatorial birds comprise the genera plover, stork, crane, curlew, snipe, sandpiper, lapwing, rail, crake, gallinule, phalaropus, and coot. Amongst the *Gallinaceæ* we find the dove, the ptarmigan (*Tetrao Lagopus*), grouse, the blackcock (*Tetrao Tetrix*), the Gelinotte (*T. Bonasia*), the woodgrouse (*T. Urogallus*), the bartavelle (*T. rufus*) and the partridge. The *Passeres* exhibit the nuthatch, creeper, crow, oriole,

shrike, warbler, wren, titlark, wheatear, crossbill, finch, bunting, thrush, starling, fly-catcher, wagtail, lark, titmouse, and swallow. The *Scansores* show us the woodpecker, wryneck, hoopoe, cuckoo, and kingfisher, while twelve species of *Raptores* are known, i. e. the Lämmergeyer (*Gypaëtus barbatus*), two eagles, five falcons, and four owls. The birds in Monte Rosa, which habitually ascend above the level of 10,000 ft., are the Lämmergeyer (*Circus cineraceus*), gerfalcon (*Falco vespertinus*), and the three grouse.

ALPINE REPTILES.—The common frog is found nearly at the height of 10,000 ft.; the ringed snake at 7,000, and the viper, blind worm, and Alpine newt at 6,000. Another species of viper (*V. chersæa*), several newts the common spotted species, and another quite black, the Alpine frog, and the mountain lizard, occur at less elevations.

ALPINE FISHES.—The loach, the pike, the salmon, the perch, and the umber, form the principal types of Alpine ichthyology. The same confusion exists respecting the species of trout and salmon inhabiting the Alps as between those of Northern Europe, and much further information is required on this topic.

INVERTEBRATA.—The Alpine *Invertebrata* do not call for any special remark. The *Mollusca* attain often high elevations. Thus, the *Vitrina diaphana*, which is the common Alpine snail, mounts so high as 7,500 ft. while other species, e. g. *V. pellucida*, *Achatina lubrica*, *Limneus ovatus*, *Pisidium fontinale*, *Helix arbustorum*, are restricted to lower elevations. The *Annulosa* merely exhibit the forms of Central Europe. The *Gomphocerops pedestris*, allied to the locust, ranges so high as 7,000 ft., and the *Tipula* to 8,000. The gadflies and the *Hymenoptera* also frequently attain great heights. A few *Myriapoda* and *Crustacea* are to be found at high elevations.

Art. XII.—Meteorology and Hypsometry of the Alps.

INSTRUMENTS USED BY TRAVELLERS.

The study of the meteorology of high mountain regions is still in its infancy. Isolated observations supply data for speculation, and suggest trains of enquiry, but no positive conclusions can be derived without systematic observation, continued, in some cases, for a considerable period. There is reason to hope that this branch of scientific enquiry will henceforward be efficiently prosecuted in the country to whose share it naturally falls. It is said that arrangements have been made by a number of Swiss men of science for the establishment of Alpine observatories, at which observations may be made continuously upon an uniform plan, and with reliable instruments. So far from discouraging travellers from carrying instruments and making observations, the effect of this announcement should be the exact opposite. Isolated observations, which hitherto have had little or no value, will hereafter, when properly made, be comparable with many simultaneous observations made at a number of stations in the Alps, and thereby acquire a significance which they would not otherwise possess. Whenever the projected arrangements in Switzerland are completed, notice will doubtless be given to those interested in the subject. As soon as the precise nature of the intended observations, the position of the stations, and the hours of observation, are made known, there will be an inducement to travellers to choose instruments and make observations elsewhere in the

Alpine chain that may be compared with those in Switzerland. Amateurs must be reminded that it costs but very little more trouble to use the precautions which give to observations a certain scientific value, and that without these precautions meteorological and other instruments are mere toys, that may amuse the owner, but have no real use. Useful observations are made with *good instruments*, they are made as far as possible *comparable with standard observations* made in fixed observatories, and they are preserved by an *accurate record*.

Good instruments may be obtained from many good makers to be found in England, France, Germany, and Switzerland. The instruments commonly sold are useless for scientific purposes.

To make future observations in the Alps comparable with those about to be established in Switzerland, the instruments used by the observer should be carefully compared with the Swiss standards, and the differences noted. The mode adopted there for protecting the thermometer from radiation, and for avoiding other sources of error, should be followed as nearly as possible. As far as it may be possible, observations should be made at the hours adopted by the Swiss observers, allowance being made for the difference between the observer's watch and Swiss time. Much inconvenience will be avoided by having instruments graduated on the scales universally adopted on the Continent. The Fahrenheit scale for the thermometer is a relic of barbarism, and is a source of constant, though petty, annoyance in comparing English with foreign instruments, or even in ordinary conversation with foreigners. It may be hoped that most travellers will hereafter carry thermometers graduated on the centigrade scale, and barometers graduated to millimetres, thereby greatly facilitating the use of tables, as well as the comparison with foreign instruments.

Although the prospect of making useful meteorological observations depends mainly on arrangements which are not yet fully in operation, every traveller may make his contribution to the *Hypsometry* of the Alps. The heights of the principal peaks, and of a multitude of minor points, those of known passes, villages, lakes, and generally all those interesting to an ordinary traveller, have been determined with great accuracy in Switzerland in the course of the survey for that noble work, the Federal Map. The French Government Map of Dauphiné, when published, will contain a considerable number of heights accurately determined; and in the Austrian Alps the older determinations, often inaccurate, have been verified and corrected by a new triangulation, the results of which have not yet been published. Piedmont and Savoy are still in a very backward condition. A certain number of heights have been determined trigonometrically, but the writer is not assured that the results merit complete confidence, and there are many mountains and passes of which it is certain that no trustworthy measures have yet been made. There is, therefore, room for useful activity on the part of travellers carrying good instruments. It is commonly believed that the determinations of heights by means of the barometer are not comparable in point of accuracy with trigonometrical measurements. This is true in respect to accessible points, where the measurement has been made by means of angles simultaneously observed between the upper station and a lower station, whose height and true position are already known. Comparatively few heights have been determined in this manner, and those of points not

reached by the observers, determined by means of angles taken from known stations, are liable to the serious objection that, if these stations be near, there is no certainty that the same point is seen from both the lower stations, while, if they be distant, an error in the assumed coefficient of refraction will very materially affect the result.

M. Plantamour, the distinguished director of the Observatory at Geneva, has shown what an important cause of error in the barometric determination of heights depends upon the difference between the true mean temperature of the stratum of air included between the upper and lower stations, and the assumed temperature derived from the mean of thermometric observations taken at both stations near to the surface of the earth. He has shown, at the same time, that the consequent error is greatest when observations are taken at the hottest and coldest hours of the day, and least at the hours when the thermometer is nearest to the mean temperature of the day, i. e. about three hours after sunrise, and half an hour after sunset. The multiplication of stations in Switzerland, where the thermometer and barometer will be regularly observed and recorded, will, among other consequences, give the means for greatly increasing the accuracy of barometric measurements of heights. The general result to be derived from the recent discussions on this subject, is that the various processes commonly adopted for the determination of heights admit of much less accuracy than is commonly supposed.

Art. XIII.—The Snow Region of the Alps.

GLACIERS.—AVALANCHES.*

A large part of the heat which the sun sends to the earth is expended in converting water into vapour, and raising it into the atmosphere. As soon as any portion of the atmosphere becomes over-saturated with vapour, this is precipitated, at first in the form of cloud, and, if not reabsorbed, ultimately reaches the earth again as rain. Several causes, which it is beyond our limits to discuss, combine to lower the temperature of the air as it is raised above the earth's surface, and at a sufficient height it becomes so cold that whatever vapour is condensed takes the form of snow and sleet. In falling to the earth this is usually reconverted into water, but in high mountain districts, where the temperature of the surface is also low, the greater part of the aqueous vapour returned from the atmosphere remains in the form of snow. When the air is calm, the snow of the high Alps consists of regular crystalline forms of exquisite beauty, being wonderfully varied modifications of a six-rayed star. When the air is disturbed, the snow assumes a new condition, which is that of small frozen pellets, little larger than a pin's head. It is this which forms that blinding snow-dust well known to those who have ever experienced the *tourmente*. The snow that falls on the exposed ridges and steep slopes does not long remain there. The larger portion is generally carried away by the wind; a further portion accumulates till the slope becomes too steep, when it slides down in an avalanche; and a small part is disposed of by melting and evaporation. The result is,

* In giving a brief sketch of the present state of our knowledge of the phenomena of the snow region of the Alps, the writer involuntarily enters upon a discussion which has furnished abundant matter of controversy, now in great part set to rest. Those who desire fuller information may refer to the original writings of Rendu, Forbes, Agassiz, and Tyndall, or may satisfy themselves with an article in the *Edinburgh Review*, for January 1861.—[Ed.]

that nearly the whole of the snow falling on high mountains is retained in the hollows, or on the more level parts of the surface. If these hollows and plateaux are below the level of perpetual snow, or, in other words, if they are so situated that the annual melting equals the quantity of fresh snow annually supplied, no accumulation can take place. A certain quantity of snow is gathered into these storehouses every winter, and is removed during the following summer, the same process being renewed year after year. This condition of things is seen in the Carpathians, the ranges of Central Spain, and many other European mountains, whose summits rise above the level of perpetual snow.

The case is otherwise when the winter snows are gathered in hollows and plateaux where the rate of melting is less than the annual supply. The first impression of a person speculating on the subject would be, that under such circumstances the accumulation would go on without limit, and that a layer of snow constantly increasing in thickness would be formed on these parts of the surface. To understand what actually occurs, a little detail is necessary.

The higher region of the Alps, and other high mountains, is subject to a constant alternation between heat and cold. In clear weather this takes place between each day and night; in clouded weather the intervals are longer. The sun shining upon the mass of snow-dust and minute crystals partially melts them, and ultimately fuses them together, till they form grains of larger size, which are frozen together into compact particles of ice during the next interval of cold. At first this process is confined to the uppermost layer of the snow, but as the alternate melting and congelation are frequently renewed, a similar change extends through the mass, which is gradually converted into that peculiar condition that has been called *névé*, or in German *Firn*. The longer the exposure of a layer of snow has lasted, the more complete the change into *névé*; the sooner a fresh layer falls, the more imperfect will be the conversion of the older one.

A section of the upper strata of the *névé*, here and there exposed on the sides of a crevasse, shows successive layers whose upper surfaces are seen to be more near the condition of ice than the interior portions. In the lapse of years the *névé* increases layer by layer, one of them corresponding to every considerable fall of snow, until a considerable weight presses on the lower and older portions of the mass.

To understand what effects are produced by this pressure, we must bear in mind an important property of ice, to which the name *regelation* has been given. Two surfaces of ice, at or very near the melting-point, when brought into contact, freeze together so completely that no trace of their original separating surface remains. Adequate pressure applied to a mass of fragments of ice, by forcing them into positions where their surfaces come into contact, causes regelation, and finally welds the whole into a single block. Such is the change that is effected in the recesses where the Alpine snows are stored. Having been first brought to the condition of granular *névé* by the sun's action, these grains are more and more completely united in the deeper portions of the mass into nearly compact ice.

If the reservoirs of which we have spoken were closed basins of sufficient depth, they would simply become filled with stationary masses of ice; but, as a general rule, this is not the case. They partake of the general slope of the

mountain, and each is connected with the lower level by a valley, glen, or ravine, through which the snow would speedily flow if it were converted into water. But, under adequate pressure, ice, and especially such imperfect ice as is formed from the *névé*, possesses a considerable degree of plasticity. It yields in the direction of least resistance. A piece of ice compressed in a mould yields until it fills all the inequalities, and produces an accurate cast of the mould. The vast masses of *névé* that are piled in the upper valleys of the Alps yield in the same way to the pressure caused by their own weight, and gradually flow downwards through the channel of these valleys. In other words, they become *glaciers*.

We now see that the essential condition for the formation of a glacier is the existence of a reservoir large enough, and at a sufficient height, to accumulate such a mass of *névé* as will, by its weight, convert its own substance into ice, and force it to flow in whatever direction it encounters the least resistance. In moving onward the glacier conforms to the laws that regulate the motion of imperfect fluids. The resistance of the sides and the bed on which it moves retards the motion of the adjoining portions of the ice. The centre, therefore, moves faster than the sides, and the surface faster than the bottom. When the ice-stream flows through a bend in the valley, the point of most rapid motion is shifted from the centre towards the convex side of the curve. While the ice thus conforms to the laws of fluid motion, the internal changes by which it is enabled thus to comport itself are peculiar, and have no example among other bodies of which we have experience. The nature of the motion, involving constant changes in the relative positions of the particles, implies fracture, which must be frequently renewed, but this would speedily reduce the whole to a mass of incoherent fragments, if it were not for the property of regelation. At each step in the progress of the glacier this repairs the damage done to the continuity of the ice, and by the twofold process of *fracture and regelation*, the glacier moves onward, constantly changing its form, yet presenting a continuous mass of solid hard ice.

The rate of progress of a glacier depends upon various causes, but mainly on those which would regulate its motion if it were converted into water,—viz. the dimensions of the reservoir, and the inclination of the slope down which it flows. It is also influenced by temperature: the more near the ice is to its melting point, the more easily it yields, and the faster it moves. The quickest progress yet observed has been on the Mer de Glace near Chamouni, some parts of which advance 30 inches a day in summer, and about 16 inches in winter. It is nearly certain that the cold of winter penetrates but to a slight depth into the interior of the glacier, and this accounts for the continuance of the motion in that season.

The above description applies to true glaciers, which, as we have seen, are rivers of ice flowing through definite channels. There are in the Alps a vast number of smaller accumulations of *névé*, gathered into the lesser hollows and recesses of the surface, that give birth to minor glaciers, or *glaciers of the second order*, in which the phenomena of the true glaciers are imperfectly exhibited. In these the conversion of the *névé* into ice is incomplete, and the approach to the law of semi-fluid motion but slight. These secondary glaciers usually lie on steep declivities, and their downward motion, which is trifling as compared with that of the greater ice-streams, is mainly effected by sliding on the underlying surface of rock.

Returning to the description of the true glaciers, we have next to remark that although the ice of which they are composed is amenable to pressure, it is entirely devoid of the other chief attribute of imperfect fluids or viscous bodies—it is incapable of yielding to tension. When the general movement of the glacier tends to draw asunder adjoining portions of ice, this is unable to obey the strain, the mass is rent through, and in this manner are formed the *crevasses*. These are among the best known and most characteristic of glacier phenomena. They are most numerous and widest in summer, when the glacier moves most rapidly, and are partially or completely closed up in winter, when the onward flow of the ice is slackened. But the same causes recur year after year, subject to slight variation owing to the differences of seasons, and, as a general rule, crevasses reappear annually in the same places, though the ice in which the rent takes place may have been some hundreds of feet higher up the stream in the preceding season. Crevasses are at first narrow fissures, and are gradually enlarged by the onward motion of the glacier, increasing from a few inches to many feet in width, and sometimes reaching to a great depth. The positions in which crevasses usually oppose the most serious obstacle to the Alpine traveller, are those where the bed of the glacier suddenly changes its inclination from a gentle slope to a steeper declivity. The ice, as it bends over the convex surface, is rent by transverse crevasses of great depth and width, which often cross the entire breadth of the ice-stream, and these are repeated as each successive portion arrives at the same point, so that the result is to form a series of deep parallel trenches, divided by massive walls, or ramparts of ice, giving the glacier when seen from a distance the appearance of a gigantic staircase. It not unfrequently happens that, in the same places where the ice is thus rent by one set of parallel crevasses, another system of crevasses may be formed running transversely across the first. In this way the whole of the surface is cut up into isolated tower-shaped masses. When first formed, the sides of crevasses are more or less vertical walls, with well-defined edges, but the exposed parts of the ice are rapidly attacked by the sun, and even by the air and by rain. In a short time the flat-topped ramparts and turrets have their upper edges eaten away till the broad rampart becomes a sharp ridge, and the tower a pointed pinnacle. This is the origin of those singular and beautiful forms that are often seen towards the lower part of an ice-fall in the greater glaciers, where the crevasses penetrate to a depth that must be reckoned by hundreds of feet.

A peculiar sort of crevasse, somewhat different in its origin from the rest, is best known by the German name *Bergschrund*. This appears to arise along the line of separation between the fields of *névé* that partake more or less of the downward movement of the glacier, and the upper snow-slopes that remain attached to the rocky skeleton of the mountain. A continuous fissure, sometimes 20 or 30 ft. in width, marks the separation, and interposes a formidable obstacle to the traveller who seeks to reach the higher peaks.

When an ice-fall occurs in the higher part of a glacier, where it is covered by a considerable depth of *névé*, the crevasses naturally cut through the *névé*, and expose sections showing the outcrop of the successive beds of snow from which it was originally formed. When it is cut up by the intersection of transverse crevasses, the *névé* often appears in the form of huge square blocks, known since Saussure by the name *séracs*.

A remarkable phenomenon, seen only on the greater glaciers, is that presented by the so-called *moulins*. During the summer, when the sun acts with great force, the melted ice soon forms rivulets on the surface. In portions of the glacier intersected by crevasses the superficial water is quickly carried off; but where the ice is compact, these rivulets uniting together may accumulate until they form a considerable stream. Sooner or later this encounters a crevice, perhaps at first very small, but this is enlarged by the action of falling water till a vertical shaft is formed in the ice, through which the stream is poured in a waterfall that is lost to sight in the depths of the glacier.

Among other apparent objections to the above-given explanation of the origin of glaciers, it may occur to the reader that as considerable pressure is necessary to account for the conversion of the *névé* into ice, the upper strata which have not undergone this pressure ought to continue in the state of *névé*, and that the upper surface of the glacier should consist of *névé*, and not of ice. This objection loses sight of the vast amount of *ablation*, or loss, which a glacier annually undergoes through the melting of the surface. By mounting high enough on each glacier, we do find the upper surface formed of *névé*, but as it descends to a lower level a fresh slice of the surface is annually cut away by the sun's heat, and, taking a rough average, it is not too much to assert that the ice which we find on the surface in the middle or lower part of a glacier was 200 feet deep at the time when the same part lay one mile higher up the stream. For this and other reasons the writer is persuaded that the depth of the greater glaciers has hitherto been much underrated. If we possessed continuous series of observations on any of those glaciers, showing the annual rate of progress in successive parts of the stream, and the corresponding loss by ablation, we should be able to infer with great probability the thickness of the deposit in the reservoir from whence it flows.

It is clear that the farther a glacier flows towards the lower region, the greater will be the annual amount of ablation. At length it must reach a point where the amount of annual melting of the ice equals the amount borne down by the progress of the glacier, and at that point the latter must come to an end. The inequalities of the seasons may cause a slight oscillation in the length, especially when several successive seasons concur to produce the same effect. Abundant winter snow and cool summers cause the glaciers to advance, while opposite conditions cause a contrary result. The more considerable changes that have been occasionally recorded have been probably caused by local accidents.

During the summer months, as we have seen, the glacier is covered with streamlets produced by the melting of the surface; the sun is constantly eating away the edges and sides of the crevasses, and the air and the earth dissolve a portion of the under surface. The plenteous supply of water from all these sources finally makes its way to the rocky bed, where it passes on under the ice, and finally issues in a single stream from the foot of the glacier. Here the ice usually forms a dome-shaped arch, whence the stream flows out into the valley, and whose beautiful azure tints attract the notice of travellers.

The appearance of the surface of a glacier usually differs much from the previous conception formed by a stranger. Instead of the clear hues of ice,

he finds it soiled by earth and other impurities, carried from the slopes of the adjoining mountains by violent winds. The surface is generally very uneven, for, even in the parts free from crevasses, the same ice over which the traveller walks was at some earlier period of its history rent by fissures, and has probably passed through the wild confusion of an ice-fall. Lower down, when pressure came into play, the broken members were welded together again so as to form a continuous mass, and the greater irregularities of the surface were removed; but many minor hillocks and depressions, unsuspected at a distance, preserve a record of the changes that have been undergone.

Besides the minor impurities that fleck the surface of the ice-stream, there are other more important foreign bodies borne down by it. The traveller who views it from some commanding station will almost always detect a fringe of blocks of stone, of various sizes, lying along both sides near to the bank, and may usually trace one, two, or more lines of blocks descending from the upper end of the glacier, and marking a continuous trail along the course of the stream. The general name for these trains of blocks is *moraines*. In the ceaseless progress of decay which is eating away the solid materials of the mountains, blocks of stone, accompanied by finer gravel, constantly fall from the steep slopes above upon the surface of the ice. As this gradually advances it receives fresh contributions, and in this manner are accumulated the blocks and gravel along the sides of a glacier that are known as *lateral moraines*. As the glacier is wasted away by melting in the lower part of its course, a portion of the lateral moraine is stranded on the bank; a further portion finds its way to the glacier-bed through the crevasses that usually abound near the sides; and, except under peculiar circumstances, a small portion only is carried down to the foot of the glacier. When two glacier streams flow together, each being provided with its lateral moraines, the consequence is that the two moraines that are brought together become joined and confounded into one in the centre of the united ice-stream. In this manner is formed a *medial moraine*. Being far from the edge of the glacier, it is much less exposed to destruction than the lateral moraine. It sometimes disappears from sight in an ice-fall, but as the crevasses, though deep, rarely penetrate through the entire thickness of the ice, the blocks of stone fall only to a certain depth, and in due time, when the upper ice is removed by ablation, they come again into view. In this way huge blocks of stone are borne down from the higher crests of the Alps to the lower valleys, with the edges still fresh, and without having suffered mechanical violence. Most of the greater glaciers are formed by the union of a number of smaller separate ice streams. To the junction of each of these affluents belongs a separate medial moraine, which may often be traced for many miles from the point of junction to the foot of the glacier, disclosing the mineral composition of parts of the range difficult or impossible of access. When composed of large blocks, a medial moraine sometimes forms a ridge 30 or 40 feet in height, running along the middle of the glacier. The first impression is, that this ridge is formed of rocks piled one over the other; but it is found that each block rests upon ice, and that the reason why they form a ridge raised above the general level is that the blocks, and the gravel which accompanies them, have protected the ice from ablation.

The mass of blocks and finer matter accumulated in front of a glacier forms the *terminal moraine*. Its extent depends very much more on the form of the ground in the place where the glacier comes to an end, than on the quantity of matter transported by the glacier. In the course of ages this would almost always suffice to produce a considerable mound, if the end of the glacier remained nearly at the same point, and if it did not often happen that the larger portion falls into the bed of the stream issuing from the glacier, and is there water-worn, reduced in size, and gradually carried onward through the valley.

Not less important than the transport of rocks on the upper surface of the glacier is the action of the under surface on the mineral materials with which it comes into contact. The motion of a glacier is mainly effected by means of the internal motion of the ice, by which one part is enabled to advance more rapidly than another, but in part the motion (as originally conjectured by Saussure) is accomplished by the sliding of the under surface of the ice upon its bed. The smaller particles of stone and sand that find their way under the ice are set into the surface, and, urged by the enormous weight of the glacier, become a most powerful graving tool, which wears away the surface of the hardest rocks. Blocks of stone falling from the moraines to the bottom of the glacier through crevasses are rapidly ground down in this gigantic mill, and the materials are reduced partly to small scored pebbles, and partly to an impalpable powder, finer than the finest mud. Every stream issuing from a glacier is at once recognised by its milky colour, derived from this minutely-pulverized matter, and often retained in suspension for a distance of 60 miles and more from its source. It is this glacier-silt which has largely contributed to fill up the heads of the Alpine lakes, and no doubt a considerable quantity is carried directly to the sea through the Po, the Adige, and other rivers of the Eastern Alps.

By the process above described, every rock over which a glacier passes is worn in a peculiar manner. Not only are all projecting asperities removed, and reduced to the condition of uniform convex faces, but the surface is ground and polished in a way entirely different from the action of water or other known agents. The presence of fine striæ extending for a considerable distance, occasionally mingled with larger grooves, is one of the characteristic indications of glacial action. These have been studied with much attention of late years, since their importance as evidence of the former extension of the glaciers has been recognised by geologists. After much discussion, little difference remains among competent men of science as to the fact that the existing glaciers occupied a very much wider area than they now do, at a period geologically very recent. The exact limits of that area may not be settled, and there is room for discussion as to some of the results attributed to their action; but the fact that they played an important part as geological agents, not only in the Alps, but in other mountain countries where they do not now exist, is generally admitted.

The geological agency of glaciers is discussed in Art. XIV. Many other interesting branches of enquiry connected with the glaciers remain untouched in the foregoing sketch. They are not only amongst the grandest and most impressive objects in nature, but at the same time amongst the most fertile in instruction to the student of her laws, while their influence on the climate and conditions of large portions of the earth is of vast importance to mankind in general.

To form an adequate idea of the part played by glaciers in the general economy of nature, let the reader consider for a moment the consequences that would arise in our continent if they were to disappear. All the greatest rivers would at once be reduced to insignificant streams, rising in rainy weather, and dwindling away in time of drought. The Danube nominally rises in Suabia, but its true source, which is the Inn, along with the Salza, the Drave, and its other chief tributaries, derives from the glaciers the streams that maintain the level of the river. The Rhine, the Rhone, the Po, and the Adige, are fed almost exclusively by the Alpine glaciers, and it is these that maintain the abundant supplies of pure water that enable the Italian lakes to diffuse fertility throughout the valley of the Po.

The intimate structure of glacier ice has been much studied and discussed, and has revealed facts of new and unexpected interest. Those who feel an interest in the physics of the subject will not fail to read Professor Tyndall's highly interesting work, 'The Glaciers of the Alps.'

The phenomena of glaciers may be studied in most parts of the Alpine chain where the average height of the peaks approaches 11,000 English feet. Reckoning from west to east, the chief glacier districts are, the neighbourhood of the Mont Pelvoux in Dauphiné, the range between the Aiguille de la Sassiére and the Roche Melon, the group surrounding the Grand Paradis, the range of Mont Blanc, the entire range of the Pennine Alps from the St. Bernard Pass to the Monte Moro, the Bernese Alps from the Gemmi to the Grimsel, the Sustenhorn group from the Titlis to the Furka, the range of the Tödi and Biferten Stock, the Adula group, the Bernina group, the ranges south of the Stelvio Pass from the Orteler Spitze to the Venezia Spitze, the Adamello range between the Val Camonica and the Val Rendena, the Oetzthal glaciers in the Tyrol, and lastly, the snowy range extending from the Krimmler Tauern to the Heiligenbluter Tauern, and culminating in the Gross Glockner. The greatest single glacier is that of Aletsch, draining the S. side of the Bernese Oberland group. It descends in one unbroken stream with a length of 15 miles and an average breadth of fully one mile.

Avalanches.—It is impossible to quit the snow region of the Alps without a brief reference to *avalanches* (Germ. *Lawinen*). These are of different kinds and very different in their effects, according as they consist of snow, névé, or ice. The snow, which sometimes falls in prodigious quantities on the slopes of Alpine valleys in winter, is little compact, and when it accumulates to such a point as to begin to move, the disturbance sometimes extends to a great distance, and a mass of snow sufficient to overwhelm a village falls in the course of a few minutes. The chief danger from these avalanches, which are very common in some valleys, and are called *Staub Lawinen* (dust avalanches), arises from the roofs giving way under the weight of the snow. So much air is contained in the snow that it is possible to breathe freely, and many persons have been delivered, or have been able to work their own way out, after being buried for many days and even weeks.

Far more formidable than the Staub Lawinen are those called in German Switzerland *Grund Lawinen*. These usually occur during the spring, after the winter snow has become partially consolidated, and approaches to the consistency of névé. When an unusual quantity has fallen in the preceding winter, the heat of the sun in spring sometimes causes the descent of very

considerable masses in a semi-compact condition. The momentum gained in descending several hundreds or thousands of feet makes this description of avalanche very destructive in its effects. A broad passage is cleared through a pine forest as though the trees had been but stubble, and when it reaches inhabited places, which does not often occur, it either crushes the houses on which it falls, or buries them so completely as to make the work of extrication very difficult. In the higher valleys of the Alps these avalanches are very common in the spring, falling before the herdsmen go to the upper châteaux. The remains are often to be seen throughout the summer, and not unfrequently serve to bridge over a torrent which works for itself a passage beneath the snow.

Comparatively small glaciers, lying on a steep rocky slope, have in a few rare instances been known to detach themselves wholly or partially from their beds, and to fall into some lower valley. Should this occur in the neighbourhood of inhabited places, the result is a catastrophe as formidable as that caused by the fall of portions of a mountain. The village of Randa was in 1819 all but completely destroyed by the blast of air occasioned by the fall of a portion of the Bies glacier. Smaller ice-avalanches are of daily occurrence in the high Alps, in situations where a small glacier reaches the edge of a steep rocky slope. In warm weather, when the movement of the glacier is accelerated, blocks of ice frequently fall over the edge of the precipice, and in falling are broken into smaller fragments, each of which is, however, capable of doing severe injury. The guides, who are acquainted with the places exposed to the descent of such masses of ice, are very careful to avoid them, or else to pass very early in the day before the sun has set the ice in motion. Of this class are the avalanches that are seen and listened to with so much interest by travellers in the Bernese Oberland. They are apt to feel surprise that what appears to be no more than the fall of a little snow down the rocky face of the Jungfrau, or the Wetterhorn, should cause a roar that is impressive even at the distance of a couple of miles. They learn, on closer acquaintance, that what has appeared to be mere dust is caused by the fall of blocks of ice of very many tons weight, which are shattered into smaller fragments, each of them as formidable as a cannon-ball.

A description of avalanche, which is rarely encountered except by mountaineers in the high Alps, arises where fresh snow rests upon steep slopes of ice or frozen névé. A trifling cause may set the loose snow in motion, and when this begins to slide it rarely ceases until the whole superficial stratum has reached the bottom of the slope. The danger is not so much that of being buried in the snow, as of being carried into the bergschrund which often lies gaping at the foot of such a slope.

Art. XIV.—Geology of the Alps.*

On turning his eyes round the horizon from any commanding position in the valley of the Po, the spectator sees himself surrounded by a vast rampart of mountains, open only on the eastern side, but elsewhere enclosing the plain of Piedmont within a continuous wall. The impression conveyed to the mind is that this great range, known under the collective name of

* By M. E. Desor, of Neuchâtel.

Alps, forms but a single system, and has a common origin. The same impression is derived from the examination of a general map, such as that accompanying this volume. It is apparent that the ranges which enclose the plain of Piedmont, and extend eastward to the neighbourhood of Vienna, constitute but one chain, whose members are linked together by the action of causes common to them all.

It is true that this impression is opposed to a theory, at one time very generally received, which attributed to each mountain chain a rectilinear axis, and a general direction making a fixed angle with the equator, and which sought to trace a connection between this fixed direction and the period at which the chain was upraised. The structure of the Alps does not appear to favour this theory. Everything points, on the contrary, to the conclusion that, however various may be the direction of the separate members of the chain, their elevation has been due to a single and continuous process of upheaval.

In this vast mass of mountain there are some portions which at first sight are distinguishable as separate groups, whose limits are more or less accurately definable, and it thus happens that certain denominations, such as Maritime Alps, Graian Alps, Pennine Alps, &c., have from an early period been affixed to certain portions of the chain. These denominations, most of which were admitted by the ancient geographers, arose from the desire to recognise certain obvious facts in the orography of the country, without reference to its geological structure; but in several cases the divisions adopted by the physical geographer are the same that are suggested to the geologist by the study of the rocks of which the mountains are composed. Thus, the Maritime Alps, with a central granitic ridge limited by the valleys of the Stura and the Tinea, the Col d'Argentière, and the Col di Tenda, form a group which is as well defined to the eye of the geologist as to that of the common observer. The same may be said of the Finsieraarhorn group, the Pelvoux group, the Carnic Alps, and generally of all the groups which have a well-defined crystalline nucleus. The case is otherwise when several crystalline nuclei approach each other so nearly that there is no depression or trough apparent between the neighbouring centres, and nothing in the form of the surface to indicate a separation between them. Thus the three groups which we shall designate as those of the Valais, the Simplon, and of Monte Rosa, exhibit crystalline centres which are separated by masses of sedimentary rocks; but as many of the highest peaks are formed wholly or in part of the latter rocks—e.g. the Matterhorn and the Mischabelhörner—there is nothing to guide the ordinary topographer to establish the subdivisions that are suggested to the mind of the geologist.

The same observations apply to the Noric, and in some measure to the Rhætian Alps. The physical features of the surface do not here conform to the geological structure. Geographers have necessarily followed the former as their guide, and as it was necessary to fix some limits to the separate groups, they have usually adopted a valley or gorge,* which affords to the

* This is a very inadequate translation of the word 'cluse,' used by M. Desor in an interesting paper on the Lakes of Switzerland, and in subsequent writings, to distinguish a class of Alpine valleys, usually narrow and confined between steep walls of rock, that cut transversely across the general direction of the ridges in the district where they occur. In the writer's opinion these are, in the literal sense of the word, *cracks* in the superficial strata, but he is unwilling to coin a new name which might appear to prejudice the question of their origin.—[Ed.]

eye the external evidence of a separation between adjoining mountain masses. In this way the Pennine Alps have been held to extend from the Dora Baltea to the Toccia, and the Noric Alps from the Adige to Vienna.

The geologist is forced to look for some more positive bases of classification than the mere contour of the surface. He endeavours, amid the irregularities and disturbances of the strata, to trace the causes which have operated in upraising the mountains and have given them their present form, as the comparative anatomist strives to trace the essential elements of the animal structure amidst the varied forms assumed by the different species.

The general form and aspect of mountains depend upon the nature of the rocks of which they are composed, and on the intensity of forces that have upraised them. It is evident that peaks so bold in outline as the Matterhorn or Monte Viso could not be formed of strata such as the molasse or the flysch. Their form implies a great degree of hardness in the rocks from which they are fashioned. In the same manner it may be affirmed that the reservoirs in which the greater glaciers are accumulated, and the narrow gorges through which they now advance—or did once flow—between faces of rock that still bear the traces of their passage, demonstrate a high degree of resistance in the materials.

Inasmuch as the hardness of rocks is often found to be proportioned to their antiquity, it was long assumed that the Alps must be, even in a geological sense, very ancient. In truth, it is seen that a considerable portion of their mass is formed of granite, sienite, and other crystalline rocks older than the overlying sedimentary strata. The mineral character of these sedimentary rocks, especially in the interior of the chain, led to the belief that these in their turn belonged to the older deposits. The limestone is often dark in colour, the slates more or less crystalline in texture, and the coal when present is converted into anthracite. It is only on the skirts of the chain that the rocks assume their ordinary and familiar characters.

Ebel, and the earlier geologists and geographers, saw in the Alps a series of parallel ranges arranged in the order of their height, the loftiest occupying the centre of the chain and forming the watershed. The central range was, on account of its position, assumed to be the most ancient. There it was thought natural to find granite, sienite, and gneiss, while the outer ranges were believed to be formed of limestones, sandstones, and other sedimentary deposits. The results of modern enquiry have not justified this opinion.

It is true that the highest peaks of the Alps are formed of crystalline rocks. Mont Blanc is composed of the protogine form of granite, Monte Rosa and the Jungfrau of gneiss and mica schist, the Dent Blanche of talcose granite; but it is an error to suppose that all the crystalline masses are connected with lofty peaks, or that none of the higher summits are formed of sedimentary rocks. The Eiger and Wetterhorn, which are counted among the higher peaks, are formed of secondary limestone, and the same holds good of many other prominent mountains.

To the modern race of Swiss geologists belongs the credit of having ascertained the real order of succession of the strata, and the general plan of structure which prevails throughout the entire chain. M. Studer, who holds a foremost place amongst Alpine geologists, recognises the existence

in the Alps of a series of groups, each with its crystalline centre, sometimes parallel to each other, sometimes arranged *en échelon* like the squares of a chess-board.

The intervals between the higher crystalline masses had been imperfectly studied by the earlier geologists. It is now known that these intermediate spaces, which we shall designate by the general term *trough* (Fr. *maît*, Germ. *mulde*), are formed of rocks completely different from those constituting the crystalline centres. As a general rule, these are stratified rocks of softer and less resisting texture.

To form a correct idea of the relations between the crystalline masses and the troughs, the former may be considered as islets arising in the midst of a level plain. In the process of upheaval these islets have gradually assumed greater prominence, driving back on either side the deposits through which they had forced their way, tilting up these overlying strata, and not unfrequently completely reversing their original order of position. Thus has originated what geologists have called the fan structure, traceable in many of the crystalline groups.

As the dimensions of each separate group are small compared to the entire length of the Alpine chain, it follows that the intermediate spaces, or troughs, corresponding to the original surface, are more or less connected together. It is in these spaces that we find the clue to the geological structure of the Alps. The student must bear in mind that the crystalline nuclei are intruders on the scene, and that to find the natural order of succession of the strata he must study them in the troughs where they have undergone least disturbance.

Different opinions are held in respect to the origin of the crystalline centres. The most natural idea was to attribute to them an igneous origin, and to suppose that they were upraised in a semi-fluid or plastic condition. This is still the more general belief, especially in regard to granite. On the other hand, it must be remembered that most granites present traces of stratification. The groups of the Finsteraarhorn and the St. Gothard are mainly composed of stratified granite. Between this granite and gneiss the transition is gradual and continuous. Gneiss, as is well known, passes insensibly into mica slate and talcose slate; while these in their turn are closely connected with certain sedimentary slates and sandstones.

The time is not distant when all these rocks were held to be of plutonic origin. The study of the phenomena of metamorphism has led geologists to restrict very much this sweeping conclusion. One after another, deposits once thought undoubtedly igneous have been proved to be altered sedimentary rocks. Thus the schists of Casanna, in the Grisons, having all the external character of mica slate, have been shown by Prof. Theobald to be of sedimentary origin. More than this, fossils have been found in some mica schists—e. g. those of the Furka, which have yielded belemnites. In the presence of such facts, some geologists are tempted to question the igneous nature of most of the crystalline rocks of the Alps, and to restrict that character to the porphyries and porphyritic granites of the S. side of the chain, including in the series of metamorphic rocks not only the mica schists and gneiss, but the semi-stratified granite of the St. Gothard and the so-called protogine granite of Mont Blanc.

Without denying the importance of the facts that have led to this revulsion

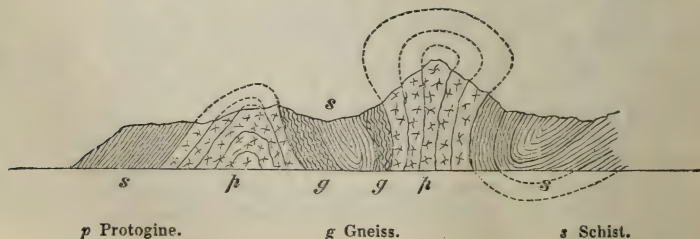
of opinion, we are not prepared to adopt a general conclusion which all but completely removes the true igneous rocks from the geological map of the Alps. For the present it appears more prudent to adhere to the classification adopted by M. Studer, and to reckon among the crystalline rocks the several varieties of granite, along with the gneiss, and all those mica schists which have not been proved to be sedimentary, either by the presence of fossils, or by interstratification with undoubted fossiliferous deposits.

So far as regards the connexion between the orography of the Alps and their geological structure, it is of little importance whether we consider the crystalline centres as originating in the eruption of igneous rocks, or in the metamorphosis of old sedimentary deposits. The essential fact is, that these masses have been brought to the surface by forces acting from beneath, and that their passage to the surface has led to the disruption of the overlying deposits.

The upheaval of the crystalline rocks has been achieved by forces that have acted with unequal intensity in various parts of the Alpine chain. The separate masses are at once less numerous and less elevated at the two extremities of the chain than towards its centre, indicating a less degree of energy in the operating forces. The eruptive force, not being there hampered by the simultaneous action of other similar operations in adjoining parts of the chain, has caused less disturbance amongst the overlying strata, which have been simply forced aside to yield a passage to the central mass. Hence we find, on surveying these outlying groups, that the strata dip outwards with much regularity from the centre, the plan of the stratification being *anticlinal*, after the fashion of a house-roof.

Different conditions have prevailed in the central parts of the Alpine chain, and especially in the Swiss, Piedmontese, and French Alps. The process of upheaval has there been accomplished by more energetic agencies, acting on many neighbouring points. Intense and complicated forces have operated on the overlying stratified deposits. They have been set on end, shoved aside, and often completely turned over, by the pressure of the intruded mass.

The crystalline masses, on the other hand, when lifted to a sufficient height, and delivered from lateral pressure, have expanded in the direction of least resistance, and have thus produced the *fan structure* so characteristic of the central region of the Alps. The gneiss and crystalline slates, forming the first envelope of the nucleus, lie in such cases upon its flanks; while the granitic masses which, when present, almost always occupy the centre of the



mass, often form vast cirques,* as in the Mont Blanc range, and at the Sept Laux (§ 8), or La Bérarde (§ 9) in the Dauphiné Alps.

It sometimes happens that two adjoining crystalline masses of unequal dimensions approach very near to each other, the one having the fan structure, and the other the simple anticlinal disposition of the strata. In such cases the resultant arrangement is that indicated in the annexed section, taken from Professor Lory.

When several crystalline nuclei approach near to each other, the result is to reduce the troughs within narrow limits, the extension of the crystalline rocks having been effected, so to speak, at the expense of the sedimentary strata. This condition is illustrated by the following section of the St. Gothard range.



There is no better position for studying the general plan of the architecture of the Alps, than in the section exhibited to a traveller following the high-road across the pass of the St. Gothard.

At the summit of the Col he finds the granitic nucleus forming a nearly level plateau, on which are several small lakes. This granite shows distinct traces of stratification, and in descending from the pass on the N. side the dip is to the S., pointing, as it were, to the internal axis of the chain. The granite is followed by crystalline slates; but on descending into the broad valley of Urseren, extending from Hospenthal to Andermatt, it is seen that the rock *in situ* is a very friable slate, sometimes of very dark colour, probably a member of the carboniferous series. This extends to the Furka at the head of the Urseren Thal, and the form of the valley, with its uniform and somewhat monotonous slopes, is doubtless due to the yielding nature of the slate, that has been easily excavated by agencies that have had comparatively little effect on the crystalline rocks. At the Urner Loch—the cleft through which the Reuss escapes from the Urseren valley to descend towards the Lake of Lucerne—the high-road again enters among the crystalline rocks, at first in the form of gneiss or mica slate, but gradually passing into true granite. This is an eastern extension of the nucleus of the Finsteraarhorn, which reaches to the Clariden Grat, and is then covered over by the sedimentary rocks of the Töli and the Biferten Stock. This second crystalline mass, here deeply cut through by the Reuss, extends through the narrow part of the valley as far as Amsteg. The valley widens out below that village as it enters amongst the limestone rocks which form on either side the fine peaks of the Windgelle and the Urirothstock.

Returning to the summit of the pass, we shall now trace the section on the side of Italy. A descent not less steep than that of the N. side leads over the same granite rocks that form the plateau, but the dip,

* Semicircular hollows with very steep walls in the form of an amphitheatre.

which on the other slope was towards the S., is now towards the N. At the base of the slope, at the village of Airolo, we again find a valley, parallel in its direction to that of the granitic nucleus; but the rocks in this trough are no longer crystalline in texture. Soft slates, dolomite, and gypsum, all represent deposits of metamorphic sedimentary rock. The same trough extends westward through the Val Bedretto, and eastward to the plateau of the Lukmanier.

Following the Val Leventina to Faido, the road enters upon a third crystalline mass—that of Tessin. This is more extensive, but less lofty and broken in outline, than those already mentioned. The rock is gneiss, very uniform in composition, which extends as far as Bellinzona. Here the mass of the Tessin Alps is interrupted by the appearance of a broad band, crossing the country in a SW. direction to Biella, and marked by the presence of metamorphic rocks, accompanied by others of igneous origin, in which hornblende is the prevailing mineral.

S. of this we enter the crystalline group of the Italian lakes, which extends in the form of gneiss to the low ridge of the Monte Cenere, crossed by the road from Bellinzona to Lugano. The latter city lies in the midst of the exterior covering of sedimentary rocks, which are broken here and there by eruptive masses of porphyry. A section traced to the margin of the plain of Lombardy exhibits in succession the trias, the lias, some scattered fragments of the cretaceous series, and, last of all, eocene deposits.

It will be observed that the arrangement of the rocks traversed on the S. side of the central range is in all essentials the same as that of the N. side. The only difference is, that the rocks are less extensively disturbed, and there are no instances of a reversal of the natural order of superposition, such as may be seen in some places in the valley of the Reuss.

Throughout the section we find three elements recurring: a crystalline nucleus, an interior trough, and an external slope. The section traverses four crystalline nuclei, three interior troughs, and a northern and southern external slope, characterised respectively by granite or gneiss in the nucleus, more or less altered sedimentary rocks in the troughs, and rocks preserving their normal aspect and position on the external slopes.

It will be readily understood that the phenomena are liable to much modification, according to the relative position of adjoining centres of disturbance, and the intensity of the forces that have acted in each of them. Thus, two nuclei may be so close that the intervening trough is not apparent to the eye, although its existence is indicated to the geologist by fragmentary masses of metamorphic rock, lifted up to a great height, and sometimes into peaks of the first order, as has happened on the N. and W. sides of Monte Rosa.

Another irregularity, of which there are several examples in the Cottian and Graian Alps, arises where the mass of sedimentary rocks on one side of the crystalline nucleus is far greater than that on the opposite side. In such cases portions of the sedimentary rock may be carried to a height much exceeding that of the nucleus, which remains half buried on the opposite slope of the range.

CRYSTALLINE ROCKS OF THE ALPS.

At first sight nothing appears easier than to distinguish crystalline rocks, owing their origin to the partial or complete fusion of the mineral materials of the globe, from sedimentary rocks produced by the action of water on pre-existing strata. We have already seen, however, that the distinction is in practice extremely difficult. Large portions of the rocks constituting the Alps have undergone changes that assimilate their external characters with those of undoubted igneous rocks so completely, that no positive limit can be fixed between them. Admitting the probability that further research will reduce to the rank of *metamorphic rocks* much that has hitherto been believed to be of purely igneous origin, we include under the heading *crystalline rocks* all those that have not been proved to be of sedimentary nature. These may again be subdivided into two groups:—eruptive rocks, including true granite, porphyry, &c.; and crystalline semistratified rocks, including gneiss, mica-schist, &c. For convenience, we may call the two groups after their prevailing types, which are respectively granite and gneiss.

It should be mentioned, at the outset, that these rocks admit of no accurate classification. The mineralogist can determine the characters, and the chemical composition of the materials that enter into them; but the rocks themselves are mixtures, in constantly varying proportions, of these different minerals, in which it constantly happens that one constituent is gradually replaced by another without any abrupt transition.

I. GRANITE GROUP.—True *granite* is a well-known and easily-recognised rock. Its essential constituents are quartz, mica, and feldspar. The latter usually forms more than half of the entire mass; it is more commonly the variety called *orthoclase*, or potash feldspar, but sometimes *oligoclase*, or soda feldspar: rarely both varieties occur mixed together. Various minerals occur disseminated through granite and the allied rocks; such are garnet, tourmaline, magnetic iron, oxide of tin, &c.

When we exclude protogine, now generally considered as a form of gneiss, from the granitic group, the extent of true granite remaining in the Alps is comparatively small. The chief masses are as follows:—1. That of Biella, extending N.E. towards Varallo, and lying between a zone of syenite and another of quartzose porphyry. This granite is composed of both forms of feldspar, and of black mica. 2. The granite of Orta, Baveno, and Mont Orfano. At Baveno the feldspar (orthoclase) has a fine rose colour, which it communicates to the granite, while at Mont Orfano the rock, in other respects identical, is pure white. 3. The granites of the Bernina group should probably be ranked in this group. 4. To the group of true granites, M. Studer is also disposed to refer the hornblendic granites of the Adamello and Monte Castello groups. These include much black hornblende, with white feldspar and black mica. Some geologists regard the crystalline nucleus of the Pelvoux group as formed of true eruptive granite, but this opinion does not appear to be well established. Recently, the same rock has been said to exist at the E. extremity of the Alpine chain, between Windisch Kappel and Windisch Grätz, but the conclusion does not seem certain.

Syenite is a form of granite in which mica is absent, and is replaced either by feldspar alone, or, more commonly, by hornblende. The change is often

so gradual that one rock passes insensibly into the other. Syenite sometimes derives a fine rose tint from the contained orthoclase feldspar. Quartz is present in small quantity, but is sometimes altogether absent. Among other minerals, zircon and sphene are often present. The latter is disseminated throughout the only considerable mass of syenite in the Alps—that extending from the Val d'Aosta to the sources of the Sesia.

Porphyry, in its typical condition, is essentially distinct from granite in this respect, that it includes fragments of other minerals set in a cement of feldspar and quartz, yet they are sometimes seen to be connected by intermediate varieties. This, as well as the other forms of eruptive rock, is confined to the south side of the main chain, if we except an insignificant trace of its presence in the Windgelle in the Canton of Uri. The attention of geologists has been especially called to the porphyritic rocks of the South Tyrol by the researches of M. Von Buch, and the once popular theory of that eminent geologist, who attributed to the eruption of the porphyries a leading part in the upheaval of the entire chain of the Alps. Three varieties of porphyry are found in the Alps. 1. *Quartzose porphyry*, usually of a red colour from the decomposition of the contained ferruginous minerals. In this variety the siliceous forms distinct crystalline masses of quartz disseminated throughout the rock, and thus sometimes approaches near to the structure of true granite. This form of porphyry is developed on a large scale in the Italian Tyrol in the valley of the Eisack and the Val di Fiemme. It is also seen on the shores of the Lago Maggiore and the Lake of Lugano, and near the sources of the Sesia. 2. *Black porphyry*, or melaphyre, differing from the last by the absence of quartz crystals, is associated with it in the Italian Tyrol, where it is often accompanied by considerable masses of conglomerate, containing fragments of the calcareous rocks through which the porphyry was forced in a fluid or semifluid state. 3. *Pyroxene porphyry* (Germ. Augit-Porphyr) is nearly allied to the last. It usually contains crystals of labradorite, and green or black pyroxene. It is found in the Venetian Alps near Schio and Recoaro, in a condition nearly allied to basalt, and in the Italian Tyrol in the Val di Fassa, the Gaderthal, &c. In that region there are sometimes seen remarkable transitions between this and euphotide, or gabbro, and it seems to pass into syenite and true granite.

Basalt is seen only on the lower slopes of the Venetian Alps, in the range N. of Verona and Vicenza. The basaltic tufas with which they are associated are nearly as rich in Eocene fossils as the surrounding nummulitic limestone, showing that the upheaval of the basalt was effected without any great disturbance of the animal life of the period.

II. GNEISS GROUP.—It has long been known that the great masses that constitute the crystalline centres of the High Alps are, in great part, formed of rocks nearly resembling true granite, yet presenting some differences of composition, as well as other distinctive characters.

Protophine.—This, which forms the crystalline axis of Mont Blanc and many of the higher groups of the Alps, contains a variable proportion of talc in addition to the ordinary components of granite, and both varieties of feldspar are commonly mixed together, which rarely occurs in true granite. Some imperfect traces of bedding are often traceable, but there is no sign of stratification apparent in the texture of the rock. The name arose when it was supposed that the rock which formed the central mass of Mount Blanc and other high mountains must necessarily be the oldest. Though the

views of geologists are now much altered, it seems more convenient to keep to the old name, than to substitute that of 'Alpine granite,' proposed by some Swiss geologists.

Gneiss has absolutely the same composition as protogine, but differs considerably in its structure. This bears distinct traces of lamination; it is traversed by veins having a constant direction, in which also the rock is readily split into flags or thinner flakes. It was seen in the above description of the principal mountain groups in the Alps, that this is by far the most widely spread of all the crystalline rocks. It forms nearly the entire mass of several large groups, and where protogine forms the nucleus, there is generally an outer covering of gneiss, the two rocks passing one into the other by insensible gradations.

Mica-schist differs little in composition from the two preceding rocks, but the proportion of feldspar is usually much smaller. Sometimes quartz and sometimes mica are the prevailing constituents, and the rock is compact or schistose in texture, as the first or the second predominate. In mountains whereof gneiss is the chief component, this often passes into mica-schist towards the outer and upper portions of the mass.

A gradual passage is also found between mica-schist and certain rocks that appear undoubtedly sedimentary, though no sufficient means exist for determining their geological age. Such are certain argillaceous schists, and the green and grey slates of the Swiss geologists.

The calcareous mica-schist (Germ. *Blauschiefer*), first remarked by Saussure, and which is abundant at the Mont Cenis, and is also found in the Salzburg Alps, is apparently a metamorphic rock, and to the same category must be referred the Roche de Corne, or '*palæopètre*' of Saussure, which sometimes assumes the appearance of mica-schist, and elsewhere appears to be closely connected with the anthraciferous palæozoic schists.

Arkesine, or talcose granite, is a rock of some importance, from its prevalence among the erratic blocks of the basin of the Rhone. It is often veined like gneiss, and differs from it chiefly by the substitution of talc for mica. This rock prevails in the central part of the Pennine Alps, and, according to M Gerloch, the Dent Blanche is entirely composed of it. The famous erratic block of Steinhof in Soleure is arkesine. With reference to the origin of that and other blocks, it is very desirable that the limits of this rock in the higher part of the Pennine chain should be more fully traced.

Chlorite-schist differs from mica-schist merely by the presence of chlorite, usually of dark green colour, in place of mica, but it passes into mica-schist and sometimes also into talcose schist. This rock is seen in several of the higher peaks of the Alps, e.g. Monte Visa, Monte Rosa, and the Gross Glockner.

Talcose schist bears the same relation to arkesine that mica-schist does to protogine. It consists almost exclusively of quartz and talc, and is usually of a light green or grey colour. It is chiefly found in Tessin and the Valais.

Hornblende schist contains hornblende, mixed in variable proportions with quartz and feldspar. Sometimes this rock is closely connected with undoubted igneous rocks, while it often appears no less intimately connected with metamorphic rocks, such as the dolomite of Avrolo and the marbles of Ornavasso. M. Studer has judiciously remarked, that it is not necessary

to assume that identity of mineral composition, in this case, implies identity of origin.

Diorite or *Greenstone* is a more compact form of the last-mentioned rock, of finer grain, and with little quartz. It occurs on the S. side of the Alps.

Serpentine is a well-known rock, consisting, when pure, of silicate of magnesia combined with hydrate of the same base. It generally contains a considerable proportion of iron, to which its varied tints are partly due, along with other minerals, such as asbestos, chlorite, &c. Serpentine plays an important part in the Alpine chain, being present at very many points, though usually in comparatively small masses. A large field for investigation remains open in regard to the origin of this rock, and its relations to the adjoining strata. It is well known that in the Apennines it presents all the appearances of an eruptive rock, having pierced through the overlying Eocene deposits, which are often converted into jasper near the point of contact. Similar relations seem to exist between the serpentine and the neighbouring rocks in the Cottian Alps, and elsewhere. In other districts, as on the N. side of St. Gotthard, and in the vicinity of Monte Rosa, a serpentine, not distinguishable from the other in mineral character, appears to be itself a metamorphic rock, so difficult is it to trace a limit between it and the metamorphic green and grey slates.

Euphotide, or *gabbro*, is a rock allied to serpentine, characterised by the presence of diallage, or smaragdite, associated with other minerals. A very beautiful variety forms a portion of the Saas Grat, and is brought down to the valley of Saas by the Allalein Glacier.

The *period of formation of the crystalline rocks* cannot be determined by the same reasoning which guides us in the study of the sedimentary rocks. In the absence of the internal evidence supplied by fossil remains, we can argue only from the apparent relations between these and the fossiliferous rocks.

Those who regard the rocks which we have described under the generic name of Gneiss Group as altogether metamorphic, cannot doubt that they represent in an altered form the most ancient portion of the earth's crust, and may look upon the protogine as the remains of the original crust formed by the cooling of the surface of our planet.

Other geologists, who consider these rocks to be essentially of eruptive character, must nevertheless carry back the date of their first appearance to a very early period, anterior, in all probability, to the epoch of the Trias. The eruption of the true granite and its allies seems to have occurred at a somewhat later period. It is apparently contemporary with the red porphyry, which, as has been shown, was upraised about the close of the Triassic Period.

The serpentine, or at least that portion of it which is certainly eruptive, was long posterior in its appearance to the preceding rocks. M. de Sismonda believes the serpentine of Piedmont to have been ejected at the same time as that of the Apennines, i.e., about the close of the Eocene Period, or the commencement of the Miocene. As already mentioned, the origin of the serpentine in other parts of the Alps is still involved in doubt, and calls for further enquiry. The small patches of basalt seen in the Venetian Alps were certainly protruded during the Eocene Period.

DIVISION OF THE ALPS INTO GEOLOGICAL GROUPS.

We now proceed to enumerate the groups into which the Alps have been divided by geologists, defining the term *group* as a mountain mass characterised by a crystalline centre, and an outer coating of sedimentary rocks.

I. LIGURIAN GROUP.

Though not usually counted as a portion of the Alpine chain, it is impossible to omit this group, which, on a small scale, exhibits all the essential characteristics of the arrangement already described. This forms the E. extremity of the curve enclosing the plain of Piedmont on the S., as the Pennine Alps do towards the N. Orographically, it serves as the link between the Alps and the Apennines, being connected by a continuous ridge with both those chains. Geologically, however, it is perfectly well defined, as the crystalline centre, formed of gneiss and mica schist, lying at the head of the valleys of the Tanaro and the Bormida, which is surrounded on all sides by a girdle of calcareous rocks. The dip of the strata is in all directions regularly anticlinal. The highest summit—Monte Mondole—is 8,005 ft. in height.

II. MARITIME ALPS GROUP.

This group is well defined to the N. by the Valley of the Stura, and to the E. and W. by the Col di Tenda and the Col d'Argentière. To the S. its outer coating of calcareous rocks falls towards the Mediterranean between the valleys of the Roja and the Tinea. Its highest summit is the Cima dei Gelas (10,433' ft.), but several other peaks towards the centre of the group attain to 10,000 ft. The Col delle Cerese and Col delle Finestre, described in § 1, as well as other passes lying farther W., traverse the crystalline centre of the group. At the summit of each of these passes is found protogine granite, flanked on either side by considerable masses of gneiss, wherein the fan structure is distinctly perceived. The general direction of the crystalline axes is from NW. to SE., but the strike of the stratification is N. and S. in the centre of the group, and beyond it NNW. to SSE.

III. COTTIAN ALPS GROUP.

Geographers are not agreed as to the limits of the Cottian Alps, and the geologist cannot aid in fixing them with any accuracy. The crystalline nucleus of this group is neither so considerable nor so continuous as in the others here enumerated. Instead of forming a well-defined mass, it may be more accurately described as a series of scattered fragments, evidently connected together, forming a curved zone, whose limits are approximately the course of the Maira to the S., and that of the Dora Riparia to the N., and whose centre lies in the Vaudois valleys of the Pellice and the Chisone. There is here no trace of the fan structure. Granite is wanting, and its place is supplied by gneiss and mica schist, which for the most part do not rise to the highest peaks, but on the E. side extend to the margin of the plain of Piedmont. If there be any remains of a zone of metamorphic rocks on that side of the chain it must be confined within narrow limits.

An opposite condition prevails on the W. side, where metamorphic rocks far surpass in extent the crystalline nucleus, and rise to a much higher

level, forming a continuous range from the Dora to Monte Viso. This unusual arrangement is accompanied by another singular phenomenon, which one day may serve to explain the peculiarities of this group. Along the crest of the range masses of serpentine, which appear to have been protruded through the surrounding metamorphic rocks, recur at intervals, extending beyond the Dora Riparia nearly to Turin, and forming in part the peak of the Roche Melon as well as several other conspicuous summits. It appears probable that the upheaval of the chain is connected with the protrusion of these masses of serpentine. The highest summit of this group, the Monte Viso, is composed partly of serpentine and partly of talcose slate and gneiss.

A branch of the principal range, characterised also by the presence of serpentine, stretches SW. from Monte Viso, and extends to the Mont Enchastraye at the W. end of the range of the Maritime Alps. This part of the chain includes several lofty summits, of which the best known is the Grand Rioburent.

IV. GRAIAN ALPS GROUP.

Some geographers include in the Graian Alps all the ranges lying between the Dora Riparia and the Dora Baltea, while others fix the S. limit at the valley of Viù, referring the range between the Mont Tabor and the Roche Melon to the Cottian group. Neither of these boundaries agrees with the geological limits of the group. The crystalline nucleus makes its first appearance in the Val Grande (§ 13), and disappears towards the N., beneath the overlying metamorphic rocks, long before it reaches the Dora Baltea. To the W. it extends to the Levanna, forming but a narrow band, while to the NE. it widens out and gradually sinks nearly to the level of the plain, from which it is but partially separated by a narrow band of sedimentary rocks. Towards the centre of the group, in the Valley of the Orco, protogine granite is present, but it does not occupy much space, nor does it rise into the highest peaks, which are composed of crystalline schists. Though this is evidently connected with the Cottian group, the direction of the crystalline axis is here directed from SW. to NE., while in the former it is nearly due N. and S. Metamorphic secondary rocks appear to have been carried to a great height on the N. side of the central axis, and the streams that descend through the valleys of Savaranche, Rhêmes, and Grisanche traverse highly altered rocks, referred by M. Sismonda to the jurassic formation, but not yet completely determined. Gneiss is seen here and there in these valleys, underlying the sedimentary rock.

The broad zone or trough between this group and that of the Belledonne (VII.) is not, perhaps, quite continuous. Two small patches of crystalline rock have been observed in the Tarentaise Alps; one of them in the valley of the Leisse, N. of Termignon, the other near the source of the Doron, on the N. side of the Col de Chavière. This appears to indicate the rudiments of a nucleus which may possibly be connected with the upheaval of the fine peaks of the Grande Casse and the Mont Pourri. In the absence of further information, we merely indicate the probable existence of a Vanoise or Tarentaise group, in a position intermediate between the Graian and the Belledonne groups.

V. PELVOUX GROUP.

This rugged mass is one of those that exhibit most distinctly the general plan of Alpine architecture explained in the preceding pages. A central

mass of granite, passing towards its circumference into gneiss, is surrounded by more or less altered sedimentary rocks. The fan structure is traceable throughout the entire group. For orographic details, see the introduction to § 9.

VI. GRANDES ROUSSES GROUP.

This comparatively small group is interposed between the last and the succeeding group. It includes a steep and narrow ridge, chiefly composed of gneiss, with one or more parallel bands of the same rock, separated by fragments of the extensive zone of liassic schists which prevails on the skirts of this and the preceding group. The dip both of the gneiss and the overlying sedimentary rocks is eastward, or in the opposite direction to that prevailing in the next group—a circumstance which, along with others, points to a close connection between them. In the valley of the Olle, which separates the two groups, the lias overlies the gneiss in unconformable stratification, indicating the occurrence of an interval between the first upheaval of the gneiss and the deposition of the lias.

VII. BELLEDONNE GROUP.

We include under this name a very considerable group, extending NNE. from the Taillefer, near Bourg d'Oisans, to the mountains of Beaufort. It is narrower and less lofty than those hitherto described—its highest peak (§ 10) being but 9,780 ft. in height—but of comparatively great length. The mass is cut through by three deep clefts, which respectively give passage to the Romanche, the Arc, and the Isère, and to three important lines of road. The direction of the crystalline axis from near the Col du Bonhomme to the Romanche is NE., but W. of the Romanche the axis runs from N to S. The main range is formed of gneiss, and in the higher part of the group protogine granite appears, and the fan structure is traceable in many places—e.g. in the mass of the Grand Charnier (§ 8). M. Lory has pointed out the existence of a secondary crystalline axis on the W. side of the principal range, formed of talcose slate, with the dip nearly vertical on its flanks, and diminishing gradually towards the summit so as to resemble the form of a gothic arch somewhat flattened at the top. Some geologists have included this group, along with the two following, under the name Western Alps, and there is no doubt that they are intimately connected together. It is natural to conceive that the crystalline axis of this group extends beneath the jurassic rocks of the Col du Bonhomme, so as to form with the following but a single ridge.

VIII. MONT BLANC GROUP.

None of the groups here described exhibit more perfectly than this does the normal type of structure. The vast mass crowned by the monarch of the Alps is at once apprehended as a homogeneous mass, unbroken by any considerable cleft or depression. The geological limits are well-defined, and agree pretty nearly with the external characters. Thus the valleys of Chanouni and Trient, and that of Montjoie, the Col du Bonhomme, the Lex Blanche (or Allée Blanche), and the Val Ferrex, constitute a geological as well as an orographic boundary to the group. Only at the NE. end of the range the crystalline axis extends across the Dranse, and even to the rt.

bank of the Rhone, where it disappears beneath the limestone and black schists of the Valais.

The fan structure is perfectly developed here, and did not escape the observation of Saussure. On the rt. bank of the Glacier des Bois, at the Col de Balme, and elsewhere, the gneiss is seen to dip at an angle of about 30° towards the centre of the range. On the opposite side, in the Val Ferrex, the angle of dip is about the same, but its direction is reversed.

The rock which prevails throughout the group is a protogine granite, composed of quartz, orthoclase, oligoclase, mica, and talc. Of this the central part of the chain is exclusively constituted. On both flanks are found gneiss and crystalline slates.

The peculiar arrangement of the peaks, or aiguilles, which is described in the introduction to § 16, has given rise to speculations among geologists which have not led to any positive conclusion.

IX. AIGUILLES ROUGES GROUP.

This small mass, which some writers regard as an appendage of the parallel range of Mont Blanc, is separated from it by a well-defined trough, marked by the valley of Chamouni, the Col de Balme, and the valley of the Trient. The nucleus of the group is confined to the comparatively unimportant range of the Brévent and the Aiguilles Rouges. The higher parallel range to the NW., extending from the Rochers des Fys to the Buet, and thence to the Dent du Midi, forms a portion of the coating of secondary rocks that lie upon the outer flanks of the range; and it is worthy of note that fragments of the same fossiliferous rocks are found on or near to some of the highest of the crystalline summits of the Aiguilles Rouges. At the NE. extremity the axis extends across the Rhone, and is seen to underlie the calcareous rocks of the Dent de Morcles.

The crystalline nucleus is composed of protogine similar to that of Mont Blanc. There is no appearance of the fan structure.

X. VALAIS GROUP.

This group includes some of the least accessible portions of the Alpine chain, and geologists have derived their knowledge of the peaks and ridges chiefly from the moraines of the glaciers that descend into the valleys of Bagnes, Hérens, Hérémence, and Anniviers. We include herein the entire mass lying between the pass of the Great St. Bernard and the Nicolai Thal leading from Zermatt to Visp, being that included in sections 18 and 19 of the present work. On three sides the limits are pretty well fixed by the Rhone, the valley of the Dranse, the St. Bernard Pass, and the Val Pellina. On the E. side the limit is less well-defined, but the presence of sedimentary rocks on the l. bank of the Visp seems to show that that valley may properly be considered as a trough separating this from the following group. M. Studer, however, has not adopted the division, and he makes the Valais group extend to the Albrun and the Bortelhorn.

The crystalline rocks forming the central portion of this group are but imperfectly known, but it may be hoped that the successful attempts made to penetrate its recesses will lead to more accurate knowledge. A peculiar green variety of protogine, called *arkesine*, which has supplied a large portion of the erratic blocks of the valley of the Rhone, appears to be

derived mainly from the neighbourhood of the Dent Blanche and the Mont Collon. Syenite is found in the Val Pellina.

The S. dip of the strata, near Chermontane at the head of the Val de Bagnes, and the N. dip in the Val Pellina, on the opposite side of the main range, are indications that the fan structure is not wanting here.

XI. SIMPLON GROUP.

As mentioned above, M. Studer has included this as a portion of the preceding group. We are led to separate them not only by the presence of a calcareous band extending along the l. bank of the Visp from Zmutt to opposite Randa, but because many facts point to the conclusion that the materials of the Saas Great and the Mischabelhörner, though crystalline in appearance, are in truth highly metamorphic sedimentary rocks.

The undoubted crystalline nucleus of this group commences on the E. side of the valley of Saas in the range of the Fletschhorn and the Weissmies (§ 21), and extends beyond the pass of the Simplon to the Monte Leone, the Bortelhorn, and the Albrun. Arkesine prevails at the W. end, granite at the E. end of the range. The fan structure is traceable in the valley of Saas and along the pass of the Simplon.

XII. TESSIN GROUP.

This group contains the most extensive mass of crystalline rock existing in the Central Alps. It is marked by the absence of those tokens of violent action that lend interest to the higher masses of the Alps. Here the crystalline mass is remarkably continuous and compact, and the ridges attain a tolerably uniform average level, unbroken by conspicuous peaks. The limits are not well fixed, but may be very roughly indicated by the course of the Tessin, from the Nüfenen Pass to Bellinzona, on the N. and E., and by the Tosa to the W. Towards the SW. there is no definite limit between this group and that of Monte Rosa, so that M. Studer has united them together. There is reason to think that a boundary may be found in the Val Anzasca, and we retain them provisionally as distinct groups. To the S. a zone of hornblende rocks, associated with schists and dolomite, marks the separation between this and the group of the Italian lakes.

The prevailing rocks are gneiss and mica schist; the latter forming the higher ridges, while gneiss occupies the lower parts of the valleys. The latter is remarkable for the readiness with which it splits into slabs, and this quality has been turned to account, and gives rise to a trade in flags and stone pillars that are produced on a large scale in the Val Maggia, Val Antigorio, and Val Leventina.

The fan structure is not found here, but it is worthy of remark that the stratification, which is vertical at the lower end of the valleys and irregular in the intermediate zone, becomes nearly horizontal towards the centre. The strike does not follow the general direction of the mass, but approaches to N. and S.

XIII. FINSTERAARHORN GROUP.

This includes the well-known peaks of the Bernese Oberland. The highest summits, such as the Aletschhorn, Jungfrau, Mönch, and Schreckhorn, as well as the Finsteraarhorn itself, lie within the crystalline nucleus, being formed partly of gneiss and mica schist, and partly of a semi-stratified

granite which sometimes exhibits a very perfect crystalline structure. The axis extends from the Lötschen Thal, where it disappears under the calcareous rocks of the Gemmi range, to the head of the Valley of the Linth, where it has raised to a great height the jurassic rocks that make up the larger portion of the Tödi and the Clariden Grat. It is deeply cut through by the valley of the Reuss. Nearly at its centre the group is traversed by a zone of hornblende rocks, which, possibly, indicate the existence of a primitive trough between two nearly adjoining crystalline centres. The fan structure is distinctly seen on both slopes of the range.

XIV. ST. GOTTHARD GROUP.

This comparatively small mass bears somewhat the same relation to that last described, that the Aiguilles Rouges do to the Mont Blanc group. They are separated only by the narrow trough of the Urseren Thal and the Furka Pass. The St. Gotthard group extends eastward on the S. side of the Vorder Rhein, and attains its highest elevation in the Medelshörner (10,500'), between the valleys of Medels and Sumvix.

The granite of the St. Gotthard is well known for its large crystals of feldspar, and for the rare minerals which it contains. It is confined, however, to the centre of the range, passing on either side into gneiss, which, in its turn, shows a gradual transition to mica-schist abundantly charged with garnet crystals. The fan structure is very evident throughout the group.

Among the minerals which are found in the granite are several containing oxide of titanium—e. g., rutile, anatase, and brookite—besides which are hematite, fluor spar, apatite, axinite, tourmaline, and remarkably fine quartz crystals.

XV. MONTE ROSA GROUP.

Though comparatively limited in extent, this group has naturally attracted much attention by its height, by the grand forms of its peaks, and by the extensive glaciers which it feeds. Its limits to the SW. are marked by a zone of metamorphic rocks extending from Aosta. A similar zone, though of small dimensions, including various metamorphic schists, and dolomitic limestones, serves to separate this from the Valais and Simplon groups. In some of the highest peaks, such as the Matterhorn and the Strahlhorn, these metamorphic rocks have been carried to a very great height. E. of the great *cirque* of Macugnaga the crystalline axis extends through a portion of the Val Anzasca between two converging masses of hornblende rock, and seemingly disappears near to Sta. Maria Maggiore. As already mentioned, some geologists regard the Tessin Alps as an easterly extension of this group. In support of that opinion, it may be urged that the rocks are nearly identical in character. Granite is here very rare, and mica-schist forms the higher part of the mass, extending to the very summit of Monte Rosa. The fan structure is not traceable here.

At the head of the al Sesia, on the SSE. side of Monte Rosa, a small mass of gneiss rises in the midst of the surrounding hornblende schists. Though of small extent, this, perhaps, deserves to be distinguished under the title '*Val Sesia Group*,' and is certainly interesting from its position, which makes it in some sort a link between the Graian and the Monte Rosa groups. M. Sismonda, indeed, believes it to be continuous with the band of gneiss

which is crossed near Donnaz in the Val d'Aosta, and is universally regarded as an eastern extension of the axis of the Graian range.

XVI. ADULA GROUP.

From the Col di Nara, E. of Faido, a rugged and rarely-trodden mass of mountains is seen to the eastward. The summits are covered with snow, and glaciers hang on their upper declivities, but are not fed by reservoirs sufficiently extensive to urge them downward into the valleys. These peaks belong to the Adula group, whose highest point—Piz Valrhein (11,153')—is rivalled by several of its neighbours. A zone of metamorphic rocks, extending northward from the Val Blegno across the Luckmanier Pass, limits the group on the W. side. To the E. it is equally well separated from the next by the metamorphic schists of the Val Misocco, traversed by the road of the Bernardino. The strike of the strata and the direction of the principal valleys is here nearly meridional, or transverse to the general bearing of the Lepontine Alps.

XVII. SURETA GROUP.

This not very important group is traversed by the Valle di San Giacomo, through which the road descends to Chiavenna from the Splügen Pass. On the W. side of that valley gneiss shows itself on the S. declivity of the chain, and rises into the peak of the Tambohorn (10,750'). On the E. side of the pass the gneiss assumes a peculiar porphyroid character, and is known by the name Rosfla granite. It extends into the upper valley of the Rhine as far as the gorge below Andeer. To the E. the limit of the group is formed by the schists of the Oberhalbstein Valley. The stratification here runs E. and W., which is the prevailing direction in the Central and Eastern Alps.

XVIII. GROUP OF THE ITALIAN LAKES.

This is a very peculiar group, and well deserves study for its bearing on the general theory of the elevation of the Alps. It is a long and comparatively very narrow band of gneiss and mica-schist, extending in a curved line from the Lago Maggiore to the upper valley of the Adda, seeming to serve as a barrier between the outer zone of sedimentary rocks on the S. slope of the Alps and the higher interior groups. This long ridge is cut across by three deep valleys, occupied by as many lakes—Orta, Maggiore, Lugano, and Como. The E. limit is not well fixed, but is apparently to be sought in the upper end of the Val Camonica. The summits bordering on the lake district nowhere attain a great height, the loftiest summit being the Monte Legnone (8,562'), near the head of the Lake of Como. At the E. end of the range the Monte Redorta, perhaps not the highest, attains 9,922 ft. The strike of the strata is generally parallel to the direction of the crystalline axis.

XIX. BERNINA GROUP.

In this group we include the highest summits of the Eastern Alps, whose importance was long underrated, but which, of late, have much attracted the attention of travellers and men of science. The central mass, or Bernina proper, includes two peaks, the Piz Bernina and Piz Zupo, exceeding 13,000 ft., and several others surpassing 12,000 ft. On either side of this are several minor mountain masses rarely visited and little known, whose relation to the central group has been but very lately ascertained. In common with M.

Studer, the writer of this sketch* regarded the assemblage of crystalline masses that surround the sources of the Inn as forming a single homogeneous mass, in which gneiss played the principal part, and wherein granite appeared merely in scattered islets surrounding the true centre of the group.

The recent researches of Prof. Theobald have completely changed this opinion. He has shown that under the name of this single group there exist at least seven† subordinate groups, each complete in itself, and differing from those hitherto enumerated in no respect save that most of them are of very small dimensions. He distinguishes them as follows:—

1. The *Bernina proper*, limited to E. and W. by the Bernina Pass and the Muretto Pass respectively. The higher peaks are composed of granite, syenite, or a syenitic greenstone.

2. The *Albigna Group*, lying between the head of the Val Masino and the Val Bregaglia. The Piz Zocca is 11,221 ft. in height, and several other neighbouring granitic peaks approach it very nearly. This borders on a little-known range whose highest summit is the Monte delle Disgrazie, in which serpentine seems to be the prevailing rock.

3. The *Julier, or Gravaservas Group*, lying between the Julier and Septimer passes and the head of the Engadine, of small extent, but very interesting on account of its peculiar mineral structure.

4. The *Piz Ot Group*, a small mass on the l. side of the Engadine, N. of Samaden. The Piz Ot is 10,663 ft. in height.

5. The *Piz Err Group*, N.E. of the last, and more distant from the Bernina, separated from it by a band of sedimentary rocks. A number of high points are gathered round the Piz Err (11,140').

6. The *Languard Group*. This includes a small mass of crystalline rocks, whose centre is the Piz Languard, now very often visited for the sake of its fine panoramic view. This group is limited to the E. and S. by the Val Chiamuera and the Val Livigno. Gneiss is here the prevailing rock, but towards the summit it passes into granite.

7. The *Poschiavo Group*. This probably includes the whole mountain mass lying between the Val Viola and the Val Tellina. It is mainly composed of gneiss, but granite appears near Brusio, on the road of the Bernina, a little N. of Tirano.

It should be remarked that none of the subordinate groups above enumerated exhibit any trace of the fan structure, possibly owing to their small extent.

It is premature to speculate on the causes which have broken up this region, where crystalline rocks are displayed on so extensive a scale, into a number of small separate centres; but it is important to observe that, looking at each of these in succession, we find no deviation from the normal type of Alpine structure.

XX. ADAMELLO GROUP.

Between the head of the Val Camonica and the Val Rendena, in the Italian Tyrol, rises a lofty range, covered with névé and glacier, with numerous summits that rise but little above the general level. The highest of these, which gives its name to the group, is the Monte Adamello

* Bulletin de la Soc. des Sc. de Neuchâtel, tome vi. p. 162.

† The range of the Monte delle Disgrazie probably forms an eighth group.—[Ed.]

(11,669'). This group is mainly composed of a well-marked variety of granite, containing hornblende,* which is encompassed by a zone of crystalline schists.

The relations of this granite nucleus with the surrounding groups, and the above-mentioned crystalline schists, are as yet insufficiently known, and well deserve further study.

XXI. MONTE CASTELLO GROUP.

S. of the Adamello, and separated from it by the head of the valley of the Chiese, is a less considerable and less lofty mass, whose highest summit is, apparently, the Monte Castello. It is most imperfectly known, and does not appear to have been visited by any geologist excepting M. Escher. Approaching it from the Val Saviore, a tributary of the Val Camonica, he found a granite somewhat similar to that of the Adamello, but containing less amphibolite, extending on the N. side as far as the Lake of Arno. In the same neighbourhood occur traces of porphyry. The district awaits further examination by a competent geologist.

XXII. THE CRTLER GROUP.

The head of the Val Camonica and the pass of the Tonale may be taken as the N. limit of the Adamello group. Beyond this boundary is a considerable mass of crystalline rocks, which have uplifted the overlying sedimentary strata, so that there is reason to believe that the latter constitute many of the highest peaks, including the Crtler Spitze (12,832') itself. The range SE. of the Crtler Spitze, including a number of high peaks, has been very imperfectly examined. The E. boundary of this group is marked by the zone of secondary rocks of the Valley of the Adige, and to the N. it encounters the carboniferous and triassic rocks that, at this part of the frontier, form a natural division between the Swiss and German Alps.

Prof. Theobald has called attention to a small mass lying between the Munster Thal and the Stelvio road, having, as it appears, a distinct crystalline nucleus of gneiss, passing towards the centre into granite, and surrounded on all sides by sedimentary rocks.

Provisionally this may be united with the Crtler group, of which it appears to be a lateral appendage.

XXIII. THE SELVRETTA GROUP.

A geologist approaching the Alps by the Valley of the Rhine, is surprised to find that he may penetrate a considerable distance into the mountains without leaving the tertiary and newer secondary formations. A great inlet, mainly formed of flysch, separates the Alps of N. Switzerland from the Rtarian Alps. The secondary rocks extend still farther in the same direction. One branch penetrates nearly to the sources of the Oberhalbstein Rhine; another, lying farther E., traverses the Inn and approaches the Adige, being raised to a great height on the flanks of the Crtler group, last described. The first mass of crystalline rocks on the N. side of the main chain is the Selvretta group, on the frontier of Switzerland and the Voralberg, forming a well-defined mass, whose highest summit is the Piz

* The same granite extends through the range N. of the Val di Genova, culminating in the fine peak of the Presenella (11,682').—[Ed.].

Linard (11,208'). Gneiss, sometimes passing into hornblende schist, forms most of the higher summits; but granite is present in the geological axis of the range. The fan structure is well developed.

XXIV. OETZTHAL GROUP.

Whether considered in respect to the scale on which the crystalline rocks are developed, or for the extent and height of the mountain mass which it includes, this is one of the most important groups in the Alps. Its limits are approximately defined by the Inn, the road of the Brenner, and the Adige; although some outlying fragments of crystalline rock cross to the rt. bank of the latter river.

The nucleus here consists of gneiss and mica-schist; the latter forming the crests, the former the outer and lower portions of the range. It is nearly cut in two by a zone of hornblendic rocks that extend to the Rofenthal. S. of that limit the direction of the axis is about due E. and W., while to the N. a second axis, making an acute angle with the last, runs from SW. to NE., both apparently meeting in the peak of the Weiss Kugel (12,620'). Each of the two axes above described is characterised by a corresponding development of the fan structure.

XXV. FASSA GROUP.

Though not very extensive nor very lofty, this is a very interesting group, and one which has occupied much space in the progress of geological speculation. The characteristic rock is no longer granite or gneiss, but red porphyry, associated with another variety of the same rock, called melaphyre, varying, however, in its mineral constituents, and sometimes passing into gabbro, syenite, and even into granite. Without ascribing to this rock the importance given to it by M. Von Buch, it seems impossible to doubt that it has exercised considerable metamorphic action on the adjoining sedimentary rocks, and more especially upon the muschelkalk. The igneous nucleus of this group is irregularly developed, having broken at intervals through the overlying secondary rocks, wherein dolomite plays the most conspicuous part. The prodigious scale on which it is here developed, rising to 11,466 * ft. in the peak of the Marmolata, and the extreme boldness of form which it habitually affects, have given just celebrity to the scenery of the Val di Fassa, which is the natural centre of the group. To the N. the igneous rocks extend beyond the Eisack, and in the opposite direction to the head of the Val Sugana.

XXVI. TAUERN GROUP.

The valley of the Adige is in many respects the most important in the whole chain of the Alps. It is that which cuts most deeply into the range, and by both its main branches leads to the lowest passes between Italy and the N. of Europe. The Eisack branch, terminating in the Brenner Pass, is that which has most significance for the geologist. It appears to occupy a primitive depression, wherein the sedimentary strata have remained comparatively little disturbed, while the regions on either side alternately suffered extensive displacement. It is this trough which separates the

* This is the result of the as yet unpublished Austrian survey as communicated to Herr Grobmann, of the Austrian Alpen Verein by H. H. Bauer and Hoffmann, and is therefore official (F.F. Tuckett). The highest peak is 11,055.6 and the second more eastern one, 10,667.6 Vienna ft.

Oetzthal Group from the long range that for want of a suitable geographical name has been called the Tauern Group. This consists mainly of gneiss and mica-schist, but the recent researches of Austrian geologists have shown that bands of sedimentary rock traverse the crystalline masses in various directions, breaking the mass into a number of subordinate groups, and, in addition to this, have thrown some doubt upon the possibility of maintaining the distinction between the mica-schists and some grey palæozoic schists of undoubted sedimentary origin. It has long been known that the highest summit of this group and of the German Alps—the Gross Glockner (12,958')—is composed of sedimentary rock, and the group as here defined, commencing on the W. with the peaks at the head of the Zillertal, terminates at the Gross Glockner, and the zone of palæozoic rocks extending thence to the Ahrental and the Pusterthal. It would be possible to subdivide farther the group so limited, distinguishing, as has lately been proposed by M. von Sonklar, the Zillertal Alps as a separate group. In the present state of our knowledge it seems most convenient to avoid further multiplication of groups.

XXVII. ANKOGEL GROUP.

This group is in every respect similar in character to the Tauern Group, of which it is orographically the eastern continuation, and from which it is separated only for the geological reasons above mentioned. Its eastern limit is marked by a zone of schists extending from the head of the valley of the Mur to the Drave. Its highest summit, the Ankogel (10,664'), is formed of a fine compact gneiss.

XXVIII. DRAVE GROUP.

The zone of palæozoic rocks extending from the Gross Glockner through the Teferegggen Thal to the neighbourhood of Brunecken, separates from the Tauern range another long and very narrow crystalline range, presenting many analogies with that of the Italian lakes (XVIII.) This group originates near the source of the Drave, and runs parallel to the course of that stream for a distance of over 50 miles, nearly to the confluence of the Möll at Sachsenburg. In the gneiss near Lienz there are indications of the fan structure. The Weiss Spitze, between the Teferegggen Thal and the Drave, is 9,703 ft. in height.

XXIX. CARNIC ALPS.

Though not reckoned among the principal groups of the Alps, the range dividing Friuli from Carinthia rises to a considerable height above the level plain that borders the Adriatic. The Burken Kogel (9,514'?), and the Paralba (8,812'), are among its highest summits. The crystalline nucleus is of gneiss and mica-schist, but this occupies little space as compared with the limestone ranges that, in common with the crystalline peaks,* feed the streams of the Tagliamento and the Piave. On the N. side this group is well defined by the zone of secondary rocks forming the mountains of the Gailthal.

XXX. HOCH GOLLING GROUP.

The chain of the Noric Alps, E. of the Ankogel Group, is divided into two branches, one lying N., the other S., of the valley of the Mur. The first of

* Crystalline rocks are seen at various points in the dividing ridge of the Carnic Alps. Do they anywhere rise into peaks? The summit of the Paralba is formed of dolomite.—[Ed.]

these is the higher, but the crystalline nucleus does not reveal itself in the summits nearest to the road of the Radstadter Tauern. The gneiss, here passing into granite, makes its first appearance in the peak of the Hoch Golling (about 9,380'), and extends thence ENE. to the Hohenwarth (7,728'). The valleys of the Ens and the Mur enclose this group to the N. and S. respectively.

XXXI. EISENHUT GROUP.

This group, corresponding to the last, and lying between the Mur and the Drave, is less considerable in height, and the mountains are in great part covered with pasturage to their summits. The highest is the Eisenhut (8,007'). As elsewhere in the Noric Alps, gneiss and mica-schist are the prevailing rocks. The W. limit is formed by the palæozoic rocks of the valley of the Lieser, while to the E. it is bounded by the broad valley, chiefly occupied by secondary deposits, extending from Klagenfurt to the valley of the Mur.

XXXII. JUDENBURG ALPS.

This group, though one of the lowest, is of more considerable extent than the last, which it resembles in its general character. In one respect it offers an interesting peculiarity. The deposits of molasse, which both on the E. and S. side abut against the gneiss rocks, show that the miocene sea reached to the base of the group. The group is nearly divided into two by the beautiful Lavant valley, on either side of which a range of moderate height runs N. and S. parallel to the valley. The higher of these forms the boundary between Styria and Carinthia. The highest summit is, apparently, the Speik Kogel (7,269'), near Reichenfels.

XXXIII. BACHERWALD GROUP.

The S. branch of the Judenburg Group does not stop at the Drave. It sends a considerable promontory of crystalline rock into the district lying between the Drave and the Save. This forms a range of hills of no orographic importance—the Bacherberg (5,184') is little more than half the height of the calcareous ranges of the Karawankas or the Terglou—but interesting to the geologist as being the SE. extremity of the series of crystalline groups that make up the Alpine chain. Gneiss is here the representative of the series.

XXXIV. THE SEMMERING GROUP.

The Judenburg and Hoch Golling Groups do not form the E. termination of the crystalline axis of the Alps. Besides the Bacherwald to the SE., a far more extensive and rather higher group extends E. of the Mur to the Semmering range, S. of Vienna, and even to the frontier of Hungary, in the neighbourhood of the Lake of Neusiedl. The mountains, if they deserve that name, have nothing Alpine in character, and the Wechsel, probably the highest summit, is but 5,824 ft. in height. This range formed the N. shore of the bay of the former miocene sea that once occupied Lower Styria. The molasse is seen along the whole S. and E. boundary of the group to abut against the gneiss, without the intervention of any intermediate zone of older stratified rock. It may be that this group is not unconnected with a small granitic district near Presburg, and through that may form a link between the Alps and the Little Carpathians.

OBSERVATIONS ON THE MODE OF ELEVATION OF THE ALPS.

To explain in a satisfactory manner the agencies by which the great chain of the Alps has been raised to its present height, is probably a task reserved for a future generation of geologists. It is but very lately that the elementary facts have been ascertained upon which any sound theory must rest, and there can be little doubt that in this direction much remains to be brought to light by those who unite the qualities of the mountaineer with the habit of observing natural phenomena. It helps to give a direction to enquiry to put forward the conclusions which seem most in harmony with the present state of knowledge.

The first observation that results from the preceding attempt to subdivide the Alpine chain in separate geological groups, having certain common characteristics, that though each group may be to a certain degree independent, there is yet an evident relation between them. In fact, if we consider at the same time any two adjoining groups, we shall in most cases find either that the one lies in the prolongation of the crystalline axis of the other, or else that they are portions of two parallel systems.

If, with the help of the geological map of the Western Alps attached to this volume, the reader will lay down on a rude tracing the position and direction of the crystalline axis of each of the groups of the Western Alps, and carry the sketch on to the Lake of Como, he will find that a single broad band, slightly curved, will cover all the exterior groups: i. e., those farthest from the valley of the Po. Taking the twin groups of the Finsteraarhorn and the St. Gotthard, with the similar pair, the Mont Blanc and Aiguilles Rouges Groups, then covering the elongated group of the Belledonne, with which that of the Grandes Rousses is in the same manner associated, and giving a more rapid bend so as to give the curve an elliptical form, he will find it pass over the Pelvoux Group, and that it may be carried on so as to include the Maritime Alps and the Ligurian Group. In this manner may be traced an exterior zone including nine groups.

If we apply a similar process to the groups rising immediately from the plain of the valley of the Po, we shall find these groups included in a similar interior zone parallel to the first. Beginning at the E. end, where its width is greatest, we have the Sureta, Adula, and Tessin Groups, followed by that of Monte Rosa, which is linked to the Graian Alps by the crystalline masses that appear at the head of the Val Sesia; and finally, the Cottian Alps at the SW. extremity.

Besides these two principal zones, we have indications of the existence of a third intermediate zone, less considerable than the others, but scarcely less important in its bearing on the general theory. If we bear in mind the small secondary group which we have mentioned in the neighbourhood of the Col de la Vanoise, and the indications of another similar crystalline islet in the Monte Viso and the head of the Val Maira, we may include both of these in a zone whose E. termination is in the Valais and Simplon Groups.

It requires no great stretch of fancy to prolong the zones of elevation here sketched out (especially the interior or Piedmontese zone) through the Rhætian Alps to the Adige. There is, however, a sufficient reason for caution in attempting so wide a generalisation. The mass of sedimentary

rocks in the Oberhalbstein valley which marks the E. limit of the Sureta Group, indicates at the same time a change in the general direction of the stratification. W. of that limit the strike of the strata is generally N. and S., whereas on the E. side it is usually E. and W., or parallel to the direction of the main ridges.

Indications, however, are not wanting to show that the separate groups of the Rhaetian Alps may be distributed in parallel zones, and further study of the numerous subordinate divisions of the Bernina Group will probably throw additional light on the subject.

A similar disposition is more evident in the chain of the Noric Alps. An outer or northern zone is formed by the Tauern, Ankogel, Hoch Golling, and Semmering Groups; and a second, nearly parallel, system includes the groups of the Drave and Eisenhut, with the Judenberg Alps forming its E. termination. To these a third interior zone may be added, if we bear in mind that the small crystalline masses of the Carnic Alps and the Bacherwald are connected orographically by the more elevated ranges of the Terglou and the Karawankas.

Having briefly indicated the relationship by which most of the separate groups of the Alpine chain are connected together, it next occurs to us to consider whether the facts lead to any reasonable conclusions in regard to the epoch of their upheaval, and the conditions under which that occurred.

Here the study of the sedimentary strata subsisting in the troughs or intervals between the separate groups, or on the outer flanks of the chain, offers the only sure guide. The broad fact that the same sedimentary deposits, varying very little in mineral character, extend over very considerable spaces on the same side of the main chain, and are often present in the troughs separating parallel groups, offers a strong argument in favour of the belief that the process of upheaval proceeded simultaneously, if not along the entire line, at least over a very wide area. When we find the same sedimentary rocks, lying in the same order of superposition, on the outer slopes of two parallel ridges, and in the trough between them—a relation which holds to a great extent in a section taken from the Val Ferrex across the range of Mont Blanc and the Aiguilles Rouges—we are entitled to infer the contemporaneous elevation of both ranges.

A still more difficult branch of enquiry presents itself when we endeavour to infer from the present condition of the sedimentary strata surrounding the crystalline centres of the Alps, the probable condition of the surface when these were originally uplifted.

In studying various mountain chains of moderate height we are led to admit as highly probable the conclusion that before the upheaval of the range the sedimentary rocks which we now find cropping out on the opposite flanks, lay in conformable stratification, forming a continuous portion of the crust until broken through by the force which carried the inferior masses to the surface. In such cases the edges of the strata exposed on the opposite flanks of the range would actually reunite if a movement of subsidence were to depress it to its former level, save in so far as denudation has since acted on the exposed section of each deposit.

There are several portions of the Alps where a similar mode of reasoning leads to a similar conclusion. As one instance, we find the stratified rocks on the opposite sides of the Belledonne Group so similar in their composition

and arrangement as to lead to the inference that they must, at one period, have formed portions of a continuous mass. An additional proof is found in the fact affirmed by M. Lory, that fragments of the same liassic deposits that lie upon the opposite slopes of the same range are preserved in the folds of the crystalline rocks near to the crest of the ridge. A similar argument may be applied to the range of the Aiguilles Rouges where patches of triassic and liassic rocks, identical with those of the Buet and the Valley of Chamouni, are found near to the summit; and as the same strata reappear in the Val Ferrex, we are led to infer the probability of their former extension over the area now occupied by the range of Mont Blanc.

It would, however, be rash to conclude from these and some other special instances that throughout the entire chain of the Alps a similar continuity of identical strata existed up to the period when its various members were uplifted. It is true, as we shall have occasion to show, that the difference between the sedimentary rocks on the opposite sides of the great chain is less great than was formerly supposed, yet the contrast is, in many respects, too great, and the distance between the scattered members of the same formation too wide to authorise such a sweeping conclusion. We must bear in mind that, with the exception of some small patches of tertiary strata, no sedimentary rocks of any description are found on the southern slopes of the Alps, through the long interval between the Val Mara and the Lago Maggiore. Throughout that space the crystalline rocks abut directly on the margin of the alluvial plain of the valley of the Po. Unless we assume the action of denudation on a scale of which we have no well-proved example elsewhere, or suppose that the entire of the original southern slope, with its coating of sedimentary rocks, has subsided below the level of the plain, and been thus concealed from view, there seems no remaining alternative but to admit that the rocks which are developed on so vast a scale in Savoy and Southern Switzerland were never deposited in the southern slopes adjoining the valley of the Po. If this imply, as it apparently must do, that the district in question was dry land while the sea flowed over the area occupied by the western and northern flanks of the chain, we must admit that the whole region must have undergone various oscillations of level previous to the great changes that determined the present relief of the surface, and learn to recognise in the Piedmontese Alps the remains of an island or shore of a continent, washed by the sea in whose bed the vast masses of sedimentary strata of Dauphiné and Savoy were being accumulated.

In support of this conclusion, and tending to prove great oscillations of level during the deposition of the strata in question, M. G. de Mortillet* has given several instances of sudden changes in the thickness of particular beds of stratified rock in the Dauphiné and Savoy Alps.

To work out these difficult problems, and trace the history of the past in the complicated phenomena of the present, is the task that remains for the next generation of geologists.

SEDIMENTARY DEPOSITS.

The sedimentary deposits of the Alps are in many respects widely different from those of all other known mountain chains. The most practised geologist, whose experience has been gained in other regions, here fails to

* Bulletin de la Société Géologique de France, tome xix. p. 857.

recognise those fixed points, which elsewhere serve to fix the position of a rock in the general succession of the strata. To gain a knowledge of the structure of a mountain district in the Alps, as M. Studer has remarked, a single section, or even several sections, are quite insufficient. In the absence of a required starting-point, the order of superposition of different masses of stratified rock conveys no accurate knowledge. It is necessary to follow patiently along the line of outcrop of each deposit, in the hope that every now and then, and at long intervals, some traces of fossils may throw a light upon his path. It too often happens that he is disappointed in this expectation, and he is often left to infer the age of one deposit merely from its relative position in respect to overlying or underlying strata, whose age has been more or less accurately determined.

The Alpine geologist has not merely to contend with the difficulties arising from upheaval and depression, the repeated folding of the strata, or the actual reversion of their original order of superposition; he has to deal with deposits, which scarcely ever retain the characters which are elsewhere familiar to him. The marls and clays here appear as hard slates, the calcareous deposits as crystalline marble, as dolomite, or as cellular limestone, and even where their mineral structure is less changed, the colour is constantly altered. Thus the representative of the chalk in the Sentis is a black limestone. The most formidable difficulty of all arises from the absence or rarity of fossils.

It is not surprising that the first attempts of Alpine geologists should have failed to discover a clue through this labyrinth. For a long time the opinion prevailed that the Alps were composed of peculiar rocks altogether different from those elsewhere known to geologists, and even thirty years ago the stratified rocks of the Alps were generally classed only in three general divisions, under the names *Calcaire Alpin*, *Flysch*, and *Verrucano*, to which on the outer flanks of the chain were added *Molasse* and *Nugelflue*. At the present day, thanks to the persevering labours of independent Swiss and Italian geologists, and to the encouragement given to geological research by the Austrians, French, and Bavarian governments,* the Alps have ceased to form an exceptional region. The principal formations, and most of their subordinate groups, have been identified with more or less precision in various parts of the chain.

As might be anticipated, the most serious difficulties have been encountered in the interior troughs, where narrow bands of sedimentary rocks are found in the spaces lying between adjoining crystalline masses, and have undergone the utmost degree of mechanical disturbance, as well as metamorphic action. Nevertheless, if it be true that these crystalline masses have been forced upwards through the overlying stratified deposits—it matters little whether in a solid or semi-fluid condition—it follows that the deposits remaining in the intervening troughs must have been originally the same as those found on the exterior flanks of the chain. Metamorphism has in many cases, however, so completely altered their aspect as to make it all but impossible to recognise them, and this is carried so far that it

* It is but an act of simple justice to add the name of our eminent countryman, Sir Roderick Murchison. His earliest papers published in 1829 and 1830, the latter jointly with Professor Sedgwick, and his important memoir on the Geological Structure of the Alps, Avennines, and Carpathians, presented to the Geological Society in December 1848, not to mention other writings, have largely contributed to the establishment of correct views as to the true relations of the sedimentary deposits of the Alps.—[Ed.]

is sometimes very difficult to distinguish between the altered sedimentary formation and the underlying crystalline nucleus.

From these observations it follows that a beginner wishing to study the sedimentary deposits of the Alps, should commence his observations on the outer slopes of the main chain where the rocks are comparatively little altered. Tracing, step by step, the same formation from the outer zone to the interior recesses of the chain, he will learn to identify rocks whose mineral structure is often widely different. In this way we find in the Valais, near Sion, the carboniferous formation well identified and associated with beds of coal worked for fuel. The coal is associated with rocks, such as certain conglomerates and schists, whose relative position and general character is such that we are able to recognise them elsewhere, even in spite of the metamorphic action to which they have been subjected.

There is no foundation for the supposition that the more ancient strata have constantly undergone a higher degree of metamorphic action than the newer formations. Thus we find at the Furka Pass, which is a continuation of the great trough of the Rhone Valley, and at the neighbouring Pass of Nufenen, similarly related to the Val Bedretto, a highly metamorphic rock, containing plates of mica and garnets, formerly counted as a crystalline schist, but now proved by the presence of belemnites to belong to the Jurassic formation.

As a general rule, the troughs, and especially those of no great width, contain only palæozoic and older secondary deposits; the newer secondary and tertiary rocks are generally absent. Thus on the new geological map of M. A. Favre we find no rock newer than the Lias in the valley of Chamouni and the Val Ferrex on the opposite sides of the Mont Blanc range. The Urseren Thal contains palæozoic rocks, with some fragments of the Jurassic formation. The trough separating the Tauern Group from that of the Drave does not appear to contain any newer deposit.

In some of the wider troughs we find the Jurassic formation developed on a large scale, and some patches of eocene limestone have been detected at one or two points; but the miocene is nowhere found in the valleys of the Alps, if we except the cases already mentioned, at their eastern extremity in Carinthia and Carniola. The molasse forms an external girdle encompassing the chain, but at a distance from the higher summits.

As we have already mentioned, it is upon the outer slopes of the Alps, and at a distance from the crystalline groups, that the sedimentary rocks can be studied to the best advantage. Here it is sometimes possible to observe the entire series, from the palæozoic to the miocene deposits, following each other in their natural order, and so much the better displayed as they are remote from the centres of disturbance. It is on this account that the Eastern Alps are, on the whole, more favourable for the study of the stratified rocks than the central and western divisions of the chain, and that we owe to the Austrian geologists several important steps in the determination of the true relations of the strata.

PALÆOZOIC, OR TRANSITION SERIES.

If it be a recognised truth that the metamorphic action, which in the Alps has so extensively modified the sedimentary rocks, depends directly or indirectly on the vicinity of the crystalline centres, it follows that the oldest formations, being generally speaking nearest to those centres, must be those which have most frequently been subjected to alteration. This holds

especially as to the Central and Western Alps. The metamorphic action has worked with less intensity at the E. end of the chain, and it is there alone that it has been possible to recover the traces of the earliest formations

Silurian and Devonian Formations.

Sir Roderick Murchison was the first to establish the existence of Silurian rocks in the neighbourhood of Grätz, in Styria. They were afterwards recognised near Werfen, in the valley of the Salza; and M. Gumbel has traced the same formation along the course of that stream westward through the Pinzgau, and as far as Rothernburg on the Inn, and eastward to Radstadt, at the head of the valley of the Enns. They have also been observed near the junction of the Mürz with the Mur. No rocks of Silurian or Devonian age have yet been identified in the Central or Western Alps, but we must not, on that account, infer their necessary absence. We may well admit, with Murchison, the probability that these earlier strata lie concealed among the vast masses of metamorphic rock whose origin still remains uncertain.

Carboniferous Formation.

To understand the part played by this formation in the Alps, we must distinguish its two main divisions—the Mountain Limestone, of marine origin, and the Coal Measures.

Like the Silurian formation, the *Mountain Limestone* is at present known only in the Eastern Alps. It was first detected by Messrs. Murchison and Verneuil, in examining a collection of fossils from Bleiberg in Carinthia which included species of *productus* and other characteristic species. It has been since recognised in the Gaithal, and on a more considerable scale in Friuli, where the Austrian geologists distinguish two subdivisions, the lower, schistose, the upper, true limestone.

While the marine division of this formation is confined to the Eastern Alps, the overlying *Coal Measures* are mainly, if not exclusively, confined to the Central and Western Alps, where they are developed on a very considerable scale. Beds of anthracite and true coal belonging to this formation, have long been known and worked at various points in Switzerland and Savoy, as, for instance, at Chandolin near Sion, at Coupeau near Chamouni, in the valley of the Isère, and that of the Arc. These beds are associated sometimes with schist, sometimes with grit or conglomerate, which may all be safely referred to the same formation. This occupies a considerable space in the provinces of Maurienne and Tarentaise in Savoy, and by its singular relations to the lias at Petit Cœur, the Col des Encombres, and other localities, has caused much controversy among geologists. In some of these cases there has been not only a complete inversion of the natural order of position, but this has been followed by a folding together of the beds, so that the older and newer deposits appear to alternate the one with the other. The impressions of ferns and other plants known to belong to the coal measures, have been the guides to a recognition of this formation in other parts of the Alps, as in the Val d'Aosta, and the Maritime Alps.

The identification of a certain conglomerate of Val Orsine, on the way from Chamouni to Martigny, by the impressions of *Sigillaria*, has been of great value, as this conglomerate, when traced to a distance, has preserved its peculiar character in spite of the alteration of the surrounding rocks.

Permian Formation.

The Permian strata have not yet been identified in the Alps with any certainty. It is not unlikely, however, that certain rocks hitherto classed as verrucano, and distinguished by Prof. Theobald as *Talcose quartzite*, should be referred to this formation. They are found in the Rhætian range, at Davos, in the Engadine, and especially in the Munster Thal.

Indeterminate Transition Rocks.

The area occupied by the palæozoic rocks, whose position in the geological scale has been tolerably well ascertained, is but small in comparison with the large extent of metamorphic rocks, probably all belonging to this series, that remain as yet to be accurately determined. In this class we include the *grey slates* and *green slates* of M. Studer, the clay slates of the Tyrol and Austrian Alps, the metamorphic rocks of the Cottian and Graian Alps, referred by M. Sismonda to the Jurassic formation, and a considerable part of the zone of metamorphic rocks, connecting the Maritime Alps with the Ligurian group. We are disposed to include provisionally, certain igneous rocks containing hornblende, as well as some mica-schists, when either are found to alternate with crystalline limestone or dolomite. The researches of future geologists may refer these rocks to their proper place in the above series, or possibly to some earlier group anterior to the Silurian.

SECONDARY SERIES.

Trias Formation.

The Trias may be said to be the characteristic formation of the eastern half of the Chain of the Alps. On crossing the Rhine we not only find it largely developed in the Vorarlberg, Algau, the Bavarian and Tyrolese Alps, and in the districts of Salzburg and Admont, but also in the interior valley of the Inn, and on the S. side of the main chain, where it extends as far west as the Lake of Lugano. We shall see farther on that, though occupying a much less area, it is not wanting in the Western Alps.

The geologist who has studied this formation in England or France, or in Germany where it is most fully developed, and who is familiar with its three well-marked divisions, known in ascending order as the New Red Sandstone, the Muschelkalk, and the Keuper, is led to expect that no great difficulty can be found in identifying deposits which elsewhere retain their general character with such constancy over a wide area. In point of fact, however, this is precisely the least easy to recognise and identify of all the Alpine sedimentary formations. Laborious and patient research was needed before it could be ascertained that the bituminous limestone of the Lake of Como, as well as a great portion of the dolomite of the Eastern Alps, are the equivalents of the Muschelkalk, and, stranger still, that the Keuper is represented by compact limestones in the Tyrol. Not only are the representatives of these deposits widely different from the ordinary forms known elsewhere, but they vary in a perplexing manner in different parts of the Alps, so that the identification of a particular rock in one district offers no clue to the determination of another coeval formation in another district, where it is utterly different in its external characters.

It is only by careful search, and minute examination of the very scanty remains of animal or vegetable life, that the principal members of this

formation have been recognised under the various disguises which they have assumed. Many of these determinations must be regarded rather as reasonable conjectures than as proved results. There is ample room for further research, which will doubtless serve to modify and complete the views now held by Alpine geologists.

On the northern side of the great chain we find the *New Red Sandstone*, represented in the Austrian Alps by red and green slates, known as the Schists of Werfen. Farther W., in the Grisons, and on the shores of the Lake of Wallenstadt, certain sandstones, and a red conglomerate, are the equivalents of the same deposit. These have been improperly called *Verrucano* from their supposed identity with the rock forming the Verruca, and the greater part of the Monte Pisano, in Tuscany. In truth the true *Verrucano* belongs to the carboniferous formation, while the Grisons rock is undoubtedly triassic. In Lombardy certain coarse conglomerates are immediately overlaid by an argillaceous slate of variable colour, called *Servino*, which appears to be a minor subdivision of this group.

The sandstones and conglomerates representing the lowest member of this formation are covered in the southern Tyrol and in Bavaria by calcareous rocks, which in some places are associated with vast masses of dolomite. Doubts have long existed, and still survive, in regard to the exact limits to be assigned to the limestones and dolomites that are developed on a vast scale in the region between the Adige and the Piave, but it is certain that a considerable portion belongs to the *Muschelkalk*. In Carinthia this division of the trias is represented by the Guttenstein limestone, while in Lombardy it corresponds to the so-called Inferior Dolomite, and to beds of bituminous limestone, rich in remains of fish, reptiles, and fossil shells, known as the Varenna and Perledo Beds.

Great difficulty has been found in the attempt to distinguish the Alpine equivalents of the *Keuper* from the underlying deposits representing the *Muschelkalk* on the one hand, and from the lowest stage of the Lias on the other. It may now be considered as decided that the Raibl Limestone of the Austrian geologists, and the St. Cassian beds of the S. Tyrol, belongs to the Lower Keuper, and to the same stage may be referred the Schists of Partnach, and the Hallstadt Limestone.

Above these lower beds of the Keuper we find vast masses of dolomite, known in Bavaria and the Voralberg as the Chief Dolomite. This corresponds to the middle Keuper, and is probably represented in the Jura by the dolomite beds that separate the *Lettenkohle*, or clay coal, of Wurtemberg from the upper Keuper.

Above the middle Keuper, represented by this great extension of dolomite, are a series of deposits which are most fully developed in the Rhætian Alps, and therefore called the Rhætian Group. It is a question amongst geologists whether this series should be attributed to the Keuper, or should be classed as a distinct member at the base of the next formation, under the name *Infra Lias*. The latter opinion is sustained by M. Stoppani, who has traced in Lombardy the equivalents of most of the members of the Keuper, as well as the Rhætian group.

M. Alphonse Favre has succeeded in tracing the trias throughout a considerable portion of the Western Alps. In contrast to the opposite end of the chain, where it forms massive peaks, it is here usually limited to a thin

band, a few feet in thickness, extending along the line of junction of the lias with the carboniferous formation, but representing an almost incalculable lapse of time.

Lias Formation.

The Lias usually presents itself in the form of marly deposits, which, even when consolidated in the form of rock, display little solidity. Hence in the Jura the outcrop of this formation, instead of being marked by eminences, usually corresponds to depressions, locally known as *combes*. The case is otherwise in the Alps, where it usually appears as a hard and compact limestone; but the fossils being for the most part identical, leave no doubt that the one is geologically the representative of the other.

The *Lower Lias* has been identified chiefly in the central and western parts of the Alpine chain. Thus a limestone deposit near Meillerie, on the Lake of Geneva, containing *Ammonites Bucklandi*, has been referred to this stage of the formation, to which also belong the calcareous schists of Petit Cœur in Tarentaise, apparently intercalated in the midst of the Coal Measures. Certain slates of the Oisans district, and limestones of the neighbourhood of Briançon, have been referred hither by M. Lory, and to the same stage Messrs. Stoppani and Ragazzoni refer a series of rocks that have been traced along the S. side of the Lombard Alps from the Lake of Garda to that of Lugano, and which are especially developed about Saltrio and Arzo.

The *Upper Lias* is represented on the S. side of the Alps by a well-known rock, the *Calcare Rosso Ammonitifero* of Italian geologists, especially developed about the Lake of Como, and near Erba, in Brianza. The name is justified by the extraordinary abundance of ammonites, yet is open to objection as not being exclusively appropriate to this formation. M. Von Hauer distinguishes two divisions of this deposit, one of which he refers to the upper lias, the other to the oolite. Some of the Lombard geologists contest this division, and maintain that the fossils supposed to characterise each formation are found associated together in the same beds. The matter deserves further investigation.

The same stage of the lias is represented in the Austrian and Bavarian Alps by several groups of deposits, of which the most important are the Adneth *Limestone*, corresponding to the *Calcare Ammonitifero* and the Spotted Marls of Algau (*Fleckenmergel*).

The Upper Lias is also found in the Western Alps, as in Tarentaise, below the Col des Encombres, and in the Bernese Alps, near Châlet St. Denis, near Blumenstein in the Stockhorn range, and above Bex. The fossils found in the two last localities seem to show that the *Middle Lias*, not identified elsewhere in the Alps, is there present, as well as the upper and lower members of that formation.

Oolite Formation.

The name Oolite has been objected to, with some reason, as being suitable only to certain members of this formation; but to the name Jurassic formation there is the stronger objection that this is vague in its limits, the term having been applied by some writers to the oolite, and by others to the oolite and lias collectively. We retain provisionally the older designation. The geologist must not expect to find this important formation so fully developed

in the Alps as in England, France, or the Jura range, but the chief subordinate groups have been satisfactorily identified.

The *Inferior Oolite* was first identified in the Bernese Alps. It is well marked in the two localities above referred to near the Blumenstein and above Bex, where it is found overlying the Upper Lias and is identified by fossils of which *Belemnites giganteus* is one of the most conspicuous. It has been traced SW. through the Canton of Vaud, and NE. to the foot of the Titlis, and by the flanks of the Glärnisch to the Lake of Wallenstadt. In Savoy its presence has been recognised near the Col d'Anterne, between Sixt and Servoz, and elsewhere in the same district. It has been found in the Knebachthal (Vorarlberg) by M. Escher, and in the Vicentine and Veronese Alps by M. de Zigno.

The *Middle Oolite*, or Oxfordian of foreign geologists, plays a more important part in the Alps than either the upper or lower members of this formation. It is to this that we refer the enormous masses of limestone which formerly, along with other members of the Jurassic System, passed under the vague name of *Alpine limestone*. It is in the chain of the Bernese Alps that this attains its maximum development; it there forms the grand peaks of the Altels (11,923'), Blumli's Alp (12,041'), the outer peak of the Wetterhorn (12,149'), and the Titlis (10,620'). The same formation constitutes much of the mountain country between the Lake of Thun and the Lake of Geneva. It is probable that the limestone which makes up a great part of the Windgelle, the Scherrhorn, the Clariden Grat, and the Tödi, belongs to the same stage of the oolite. It usually appears as a brittle hard rock, sounding under the hammer like glass, with finely granular crystalline fracture, and treacherous to the climber, as it is usually traversed by fissures along the line of stratification. This rock often exhibits a curious phenomenon known by the name of *Karrenfelder* (Fr. *lapias*). Considerable surfaces of bare rock are traversed by parallel fissures or grooves, separated by narrow and sharp edges. A good example may be seen near the Dauben See at the summit of the Gemmi Pass.

Fossils are rare in this rock; a few belemnites and ammonites are seen at intervals, the characteristic species being *Belemnites hastatus*, and *Ammonites tortisulcatus*. The belemnites are often traversed by veins of quartz or calcareous spar, while the ammonites are distorted in a manner that shows the action of enormous pressure.

The fossils lately discovered by M. Favre in the Val Ferrex on the S. side of Mont Blanc prove that this stage of the oolite formation is present there, and a continuous zone of the same rock may be traced along the W. side of the Dauphiné Alps, from Gap to the neighbourhood of Grenoble.

The Oxfordian deposits exhibit somewhat different characters on the south side of the Alps. In the Alps of Vicenza M. de Zigno assures us that beds with impressions of plants of the oolitic period are covered by a yellowish limestone containing characteristic Oxfordian fossils, while this in its turn is overlaid by the red and yellow limestone which has passed in the Venetian Alps for the *Calcare Rosso Ammonitifero*. It is, however, a different rock from that bearing the same name in Lombardy, which, as we have already seen, belongs to the upper lias, while that now in question contains species peculiar to the middle oolite; e. g. *Ammonites plicatilis*,

A. taticus, *A. anceps*, along with equally characteristic species of *Aptychus*. The Oxfordian Limestone may be traced along the Venetian Alps to the Italian Tyrol, where it is seen near Trent and Roveredo, whence it extends to Lombardy, appearing near Brescia in the form of a red siliceous limestone.

It seems probable the rock indicated by M. Gumbel in his geological map of Bavaria under the name *Upper Jura Limestone*, and which has been traced in the Vorarlberg, and as far west as the Galanda near Coire, being everywhere distinguished by the prevalence of species of *Aptychus*, belongs to this stage of the oolite, though some geologists are disposed to refer it to the Kimmeridgian section of the following division.

Various ferrugineous deposits in the Alps, such as those of Ardon in the Valais, and the iron sand of the Bavarian Alps, seem to be the representatives of the Kelloway rock, and therefore a portion of the Middle Oolite. We may perhaps include in the same group the iron deposits containing Chamosite at the head of the valley of Chamoson in the Valais, and the deposits worked for many centuries at Gonzen near Sargans.

The *Superior Oolite* appears to be developed on a scale much less considerable than the preceding group. It has not been detected either in the Eastern or Western Alps, and is limited in Switzerland, so far as we know, to the district between the E. end of the Lake of Geneva and the Lake of Thun, enclosing the upper parts of the Simmenthal and the valley of the Sarine, extending NE. as far as the Baths of Weissenburg, and SE. to the Tours d' Ay. On the S. side of the Lake of Geneva, it reappears in the province of Chablais, reaching a considerable height in the Cornettes range, and the mountains enclosing the head of the Dranse d' Abondance. The rock is a dark-coloured limestone of shaly texture. In the last-named locality these beds of secondary coal are worked for fuel. These beds, as well as the shale with which they are associated, abound in shells partly of fresh water, partly of marine origin. The fossils found on the Swiss side of the lake make it probable that the rock is the equivalent of the Kimeridge Clay, but there is some room to suspect that the beds above spoken of in the valley of Dranse belong to the Wealden formation, rather than to any portion of the Oolite.

Cretaceous Formation.

With the doubtful exception above suggested there is no appearance of any deposits in the Alps corresponding to the interval between the Oolite and the Cretaceous formations. It is only of late years that the presence of the principal subdivisions of the latter formation has been clearly made out, and the Neocomian Group, not before known at all, has been shown to be the most largely developed. The chief seat of this formation is in the Western and Central Alps. The period of its deposition appears to have been one of frequent disturbance, so that the series of its members is rarely continuous: sometimes one, sometimes another, is entirely absent, leading us to infer oscillations of the relative level of land and sea, or else very extensive denudation at successive intervals.

The *Neocomian* group forms a broad band along the French and Savoy side of the Western Alps extending from Provence to the neighbourhood of Chambéry, where it forms the range of the Grande Chartreuse. Attaining

its greatest width in the region enclosing the lakes of Bourget and Annecy, it divides into two branches, the western of which forms a conspicuous portion of the Jura range, while the eastern branch traverses the province of Chablais—and extends right across Switzerland, along the N. side of the Bernese Alps, through the Faulhorn and the Brienzer Grat, to the Pilatus and the Mythen on the Lake of Lucerne, and thence to the loftier peak of the Glärnisch. NE. of the Lake of Wallenstadt, it reappears in the range of the Churfürsten and the Sentis, and crossing the Rhine is still traced at intervals through the Bavarian Alps, and the adjoining portions of the Tyrol N. of the Inn.

This stage of the Cretaceous formation, which is best known to English geologists as the Lower Greensand, was subdivided by Studer into two well-marked members—the lower, called by him *Spatangus-kalk*, characterised by the prevalence of *Spatangus retusus*—the upper, called *Schratten-kalk*; equally well marked by the abundance of *Caprotina ammonia*. Later researches have induced geologists still further to subdivide this group, and four distinct members are now generally recognised. We shall briefly notice them in ascending order.

The *Valangian*, whose type is seen in the Jura near Neuchâtel, appears as a hard siliceous limestone at the E. end of the Lake of Lucerne, in the Glärnisch, and the Sentis.

The *True Neocomian*, or *Spatangus Limestone*, is a nearly dark limestone of slaty texture, often containing much silex. It is generally poor in fossils. Exceptions to this observation are the localities of Ricki and Ro-faïen above the Axenberg, some points in the Sentis chain, and in the valley of the Sihl. *Spatangus retusus* (*Toxaster complanatus*, Ag.), *Exogyra Couloni* and *Ostrea macroptera* are the characteristic fossils. The *Crioceras Limestone*, so named from the fossils of the genera *crioceras* and *ancylocera*, which distinguish this member of the Neocomian group in Provence. In the Alps it forms a compact limestone with a conchoidal fracture, of pale grey colour mottled with black. This is found in the Voirons near Geneva, at Châtel St. Denis, N. of Vevey, in the Justithal, near the Lake of Thun, but is chiefly developed in the range of the Stockhorn, where it forms several of the highest peaks.

The *Urgonian*, or *Schratten-kalk*, or *Caprotina Limestone*. This is a compact hard limestone, usually paler in colour than the true Neocomian, and remarkable for its sterility. It is thus often recognised at a distance, where it forms a zone of nearly bare rock on the steep side of a mountain, as for instance, on the slopes of the Hohgaut and the Abendberg, near Interlaken. In the Entlibuch, where it is extensively developed, the rain-water scoops out long tortuous channels—locally named *Schratten*—on the bare surface. Hence the name given to the rock by the Swiss geologists. The characteristic fossils are *Caprotina ammonia* and *Radiolites neocomensis*. In the upper zone occur beds formed almost exclusively of *Orbitolites lenticularis*, announcing the transition to the succeeding division of the Cretaceous formation.

The *Gault* has been traced at intervals along the margin of the Neocomian deposits from Savoy to the Sentis, and thence into the Vorarlberg and Bavarian Alps. It usually presents the appearance of a narrow band of green or nearly black sandstone, easily disintegrated. It is often rich in

fossils, and therefore very important for the determination of the under and over-lying strata. Amongst the localities where these fossils are most easily found, we may notice the head of the valley of the Reposoir in Savoy, the slopes above Saxonnet in the valley of the Arve, and the Meglis Alp and See Alp in the Sentis.

The upper division of the Cretaceous formation, which is divided by continental geologists into three groups; the *Cenomanian*, or *Upper Greensand*, the *Turonian*, or *Chalk-marl*, and the *Senonian*, or *Flint Chalk*, is far less developed in the Alps than the lower division of the same formation. The Sewen limestone, which occupies a large space in the NE. of Switzerland, where it forms the summits of the Kamor, Hohenkasten, and Sentis, is there the only representative of the above deposits. This rock is a compact, distinctly stratified limestone, of pale, or dark, or reddish grey colour, and conchoidal structure. It is sometimes bituminous, and sometimes contains flint nodules. In consequence of its close conformity of stratification with the underlying Gault it has been sometimes referred to the Cenomanian, or Upper Greensand, but the presence of *Ananchytes ovata*, a fossil especially characteristic of the true Chalk, appears conclusive proof that it should be regarded as the equivalent of that member of the series.

Certain deposits, developed on an extensive scale at Gosau, in the Salzburg Alps, and extending thence eastward into Austria, and SW. into the Tyrol, have caused much controversy among geologists. They are very varied in composition, including marls, sandstones, conglomerates, and limestones. M. Gumbel is disposed to refer these deposits to the Turonian group, to which he would also refer scattered patches of cretaceous limestone found at several localities in the Eastern Alps, e. g., at the head of the Ammergau, on the banks of the Kochel See, and on the l. bank of the Inn, opposite the opening of the Zillerthal.

The cretaceous formation is not wanting on the S. side of the Alps, but it is a matter of much difficulty to identify the rocks in that region with the subdivisions adopted elsewhere, and on that account it has appeared most convenient to notice them apart.

In the Venetian Alps the Oxfordian, or Middle Oolite, is immediately succeeded by a white compact limestone, called *Biancone*, which M. de Zigno has positively identified by its fossils with the Neocomian; it is probably to be referred to the subdivision above named, *Crioceras* limestone.

According to M. de Mortillet, the same deposit extends along the S. side of the Alps into Lombardy, but the name *Biancone* is there exchanged for that of *Majolica*. Geologists are yet undecided as to the true position of the *majolica*. One portion of it appears, like the *Biancone*, to be in no respect different from the Neocomian; but we are assured by several excellent geologists that in the lower beds of the same limestone there is found a mixture of characteristic fossils of the Oxfordian period, along with those of the Neocomian. From this fact, M. de Mortillet deduces the important conclusion that, during the long period occupied elsewhere by the Upper Oolite and the Wealden formations, the Oxfordian and Neocomian fauna here succeeded each other by a process of slow intermixture, until the former was gradually supplanted by the latter.

The Gault is not wanting in the Venetian Alps, but as the mineral character of the rock is the same as that of the underlying Neocomian, and

fossils are scarce, the identification is very difficult. The late M. Massalongo was the first to establish the presence of the Gault near Tregnago, NE. of Verona. M. de Mortillet believes that it is also represented in the sections which he has made in the neighbourhood of the Lake of Iseo, but fossils are as yet wanting.

The last-named geologist refers to the Turonian, or Upper Greensand, a grey limestone dotted with small crystals of calc-spar, sometimes oolitic in texture, and sometimes composed almost exclusively of shells and other organic remains, found in several parts of the Venetian Alps overlying the Biancone. Numerous hippurites and other fossils were found by him near the lake of Santa Croce, in the province of Belluno, and farther east in Friuli. He finds the same fossils in a conglomerate worked at Sirone in Brianza, N. of Milan, and between Gorlago and Sarnico in the province of Bergamo.

The equivalent of the Senonian, or Flint Chalk, is known in the Venetian Alps by the name *Scaglia*. It is usually an argillaceous limestone, stratified in thin layers, varying in colour from white to dull red, sometimes containing flint nodules. In Lombardy this stage is represented by beds of marly limestone alternating or passing into sandstone.

TERTIARY SERIES.

Eocene Formation.

The Eocene formation is largely developed upon the outer slopes of the Alps, and has sometimes been raised to a great height on the N. side of the main chain. It naturally forms two groups, which may best be noticed separately.

The *nummulitic zone*, once in part referred to the Cretaceous formation, but now definitively associated with the Tertiary series, of which it marks the earliest appearance, is usually a grey limestone, abounding in nummulites, but sometimes appears as a green sandstone, or as a ferruginous schist, containing many large terebratulæ and echinidæ. The iron is sometimes so abundant as to be worked, as, for instance, at Kressenberg in Bavaria.

On the W. side of the Alps, a large patch of this deposit extends from the Durance along the E. side of the Pelvoux group, and is said to attain a height of nearly 11,500 ft. in the Aiguilles d'Arves. It reappears in Savoy, where it has been lifted up on the ridge of the secondary rocks so as to form many of the highest summits of the outer range. Thus, according to A. Favre, it reaches 10,433 feet in the summit of the Pointe de Salles, and rises to a great height on the N. flank of the Dent du Midi. In the range of the Diablerets which links the Alps of N. Savoy to those of the Canton of Berne the same deposits play a still more important part, forming the peaks of the Dent de Morcles, the Grand Moëvrin, and probably also that of the Oldenhorn (10,250'). They may be traced along the summit of the range thence to the Gemmi, and then along the valley of the Kander to the Lake of Thun and the Lake of Lucerne. A parallel band extends to Rosenlaui forming the passes of the Wengern Alp and the Scheideck. The same band, apparently, reappears at Altdorf, mounts through the Schächenthal and extends along the range of the Clariden Grat and the Tödi to the Baths of

Pfäffers, showing itself on the summit of the range at the Kisten pass, Panixer pass, and Segnes pass.

The same deposits are developed very extensively in the Canton of Schwytz, where the rock changes its mineral character, becoming a green sandstone, very like the Gault, except from its fossils. They are also seen in Appenzell on both flanks of the Sentis, but they do not reappear E. of the Rhine until we reach the Styrian Alps, where they are found in several places.

On the S. side of the Alps the nummulitic deposits are largely developed, and acquire special interest from their fossil remains, both animal and vegetable. The fossil shells of Ronca and Castel Gomberto, the crustacea and echinidæ of the neighbourhood of Verona and Schio, and above all the fossil fish of Monte Bolca, and the magnificent fossil flora with its palms, and monstrous fruit of various Fracastoriæ of the same neighbourhood, have made us unusually well acquainted with the conditions of life at the period when these rocks were deposited. They speak of a shallow sea existing along a pre-existing line of coast, and subjected to considerable but not violent changes of level, the movement of subsidence being that which prevailed, and to which we owe the preservation of so many memorials of the period. M. de Zigno has pointed out the existence in the Venetian Alps, of certain beds of marly limestone interposed between the Scaglia, or Upper Chalk, and the nummulitic limestone. These beds contain in their lower part, corals and terebratulæ of Cretaceous aspect, and in their upper portion pass into a calcareous grit containing nummulites, and apparently constitute a link between the two formations, as though in this region the succession from the one to the other had proceeded without interruption.

In the Maritime Alps, and in the adjoining French department of the Basses Alpes, where the Oolite and Cretaceous formations are altogether wanting, the Eocene beds are found resting on the Lias. They may be traced from near Cuneo along the valley of the Stura to Barcelonnette, and from that place through the upper valleys of the Verden and the Var.

Flysch or *Macigno*.—This is one of the most remarkable of the sedimentary deposits of the Alps. Though it has no representative in the neighbouring mountain districts of the Jura, the Vosges, or Bohemia, it is developed in the Alps on a great scale, forming masses several thousand feet in thickness. With the exception of a few localities, no animal remains whatever are found in it, and the only organic remains are those of fuci, which are sometimes very plentiful. This is the more remarkable, as the deposit appears to have been formed slowly and tranquilly, under conditions favourable for the development of animal life.

The usual form of the *Flysch* is a fine-grained grey shale, of little solidity, and disintegrating rapidly by exposure, forming a soil very favourable to vegetation. Whenever in the Swiss Alps steep cliffs are seen to produce abundant vegetation, there is reason to suspect that they are composed of this deposit. The base of such cliffs is usually covered by huge piles of débris, which soon become covered with herbage. It is to the *Flysch* that the Gruyère district owes the excellence of its pastures. Occasionally the rock becomes harder, and is fit for use as slate. It is worked for that purpose in Savoy, at the Niesen, at Pfäffers, and at Glarus, where these slates are well known for the fossil fish which they sometimes contain. Sometimes again the *Flysch*

appears in the form of a dark-green sandstone, mottled with spots of lighter colour. This modification is called *Grès de Taviglianaz*, from a place of that name on the way between Bex and Anzeindaz.

The grit of Rallingen, on the shore of the Lake of Thun, appears to be a lacustrine deposit of the age of the Flysch. It contains impressions of plants similar to those of Sotzka, in Styria.

In spite of the apparent differences between this and the underlying nummulitic deposits, the fact that they are frequently seen associated together in conformable stratification, and that it is not rare to find a gradual transition between them, leaves no doubt that they are closely connected together. The Flysch being the more easily disintegrated, it less often remains upon the exposed summits of the exterior ranges of the Alps, where they have often been raised together to a great height. It is in the district between the Rhone and the Aar that the Flysch has been most largely developed, so much so that M. Studer has distinguished six distinct zones, which it is unnecessary to enumerate in this brief sketch.

Certain phenomena that have been pointed out in that district deserve especial notice.

The point at which the Flysch deposits attain their greatest dimensions is in the pyramidal peak of the Niesen, well known to travellers who pass the Lake of Thun. The base of the mountain is formed of a black shale, the upper part of a peculiar grit called *Grès du Niesen*. The presence of characteristic *fuci* leaves no doubt but that the whole mass belongs to the same deposit. It is very remarkable that, although the mountain rises so boldly, nearly from the shore, no trace of the Niesen grit should yet have been discovered on the opposite side of the Lake of Thun.

Near Sepey, in what M. Studer has called the Simmenthal zone of this deposit, is a conglomerate composed of angular blocks of protogine, gneiss, mica-schist, and quartz confusedly mixed together, and apparently not cemented together by the Flysch.

In the valley of Habkern, on the N. side of the lake of Thun, the Flysch contains enormous angular blocks of a granite apparently different from any yet found *in situ* in the Alps. The origin of these blocks has naturally been an object of discussion among geologists, but as yet it remains a mystery.

Miocene Formation.

Under the name of *Molasse* this formation, including both marine and freshwater deposits, occupies the entire plain of Switzerland between the Alps and the Jura. It forms the subsoil of the plateau of Bavaria, and extends eastward within a narrower zone to the neighbourhood of Vienna. Bending round the E. extremity of the chain, it spreads out near Grätz, into a plain that separates the mountains of Waradin from the outer ramifications of the Carinthian Alps. With a slightly altered aspect, it reappears on the S. side of the Venetian Alps, where its lower beds contain many fossil remains, and among others opercularia and true nummulites, on which account Massalongo proposed to distinguish these deposits by the name *Oligocene*. The existence of Miocene deposits in Lombardy has been suspected but not clearly made out. In Piedmont this formation is nowhere seen on the slopes of the Alps, but only in the low hills that rise in the centre of the valley of the Po, and on the flanks of the Apennine chain.

It is important to note that, with the exception of two or three low valleys at the E. extremity of the chain, the Molasse nowhere penetrates into the interior, but remains everywhere on the outer margin of the Alps, which it nearly encompasses. This arrangement leads to the inference that the Alps formed dry land during the Miocene period, while we have direct evidence that during the preceding period, while the Jura and central Germany were above the sea-level, a great part, if not the whole of the Alps, lay at a depth which could not be less than 12,000 ft. below the present level, and probably exceeded that amount. It appears that a vast oscillatory movement preceded the upheaval which gave to the chain of the Alps its present form.

Although limited to the outer zone, the Miocene has undergone a great amount of disturbance. Its beds are not only twisted, folded, and set on end, but in some cases huge masses, forming entire mountains, have been turned over so as to have the natural order of superposition reversed. Thus, at the Rigi Scheideck we see the Cretaceous and Eocene rocks resting on the Miocene conglomerate, and a similar reversal of the natural order is found in the Speer, and other mountains lying on the outer margin of the Alps.

On the northern and western slopes of the Alps no instance has yet been observed of a transition from the Eocene to the Miocene; on the contrary, the beds, when both are present, lie in unconformable stratification. On the S. side, in the Venetian, and also in the Styrian Alps, we have evidence of the same gradual passage which existed, as we have seen, between the Oxfordian and the Cretaceous formation, and between the latter and the Tertiary series.

Pliocene Formation.

The Pliocene is entirely wanting on the northern and western flanks of the Alpine chain, but it has been detected in Lombardy and Piedmont by the active geologists who have thoroughly examined the margin of the valley of the Po, which during some portion of this period must have formed the bed of a shallow sea. The localities of these deposits are Castenedolo near Brescia, Nese, NNE. of Bergamo, La Folla d'Induno, near Varese, and several points between the Lago Maggiore and Ivrea. Near the latter town, M. de Mortillet has found a littoral deposit of rolled pebbles, containing masses of lignite arising from the accumulation of floating wood. The same geologist attributes the fact that the Pliocene is thus limited to a few scattered patches, to the action of denudation upon incoherent deposits, incapable of resisting the prolonged action of the elements.

The beds in question, as well as the coeval deposits near Asti in the valley of the Po, are all very nearly horizontal, showing that there has been no considerable disturbance of the surface since their deposition.

Pleistocene Period.

The geological period which commenced with the establishment of the present fauna and flora has by some writers been elevated to the rank of an epoch, equivalent to those marked by the commencement of the Secondary and Tertiary Series, and therefore styled Quaternary Series, while others of high authority have refused to admit its claim to be counted as more than a subordinate member of the Pliocene. It seems most convenient to use a

term which does not prejudice the question in dispute, calling the interval since the deposit of the Pliocene, with its proportion of extinct organic being, by the name Pleistocene Period.

The deposits formed during this period are in most districts so insignificant in extent that they might be passed over without notice, were it not for the special interest that attaches to the history of the operations that progressed in the Alps during the interval.

These operations, whatever they may have been, have resulted in the transport of enormous quantities of solid matter from the inner and higher parts of the chain to the lower channel of the main valleys, and to the low country surrounding the base of the Alps. This transported matter is of three kinds, each of which deserves a brief notice.

1. *The Ancient Alluvium*.—This is present to a greater or less extent on all sides of the Alps, and in the bottoms of most of the great valleys, but is mainly developed on the S. side of the chain, and may there be studied to the best advantage. To this is referred the masses of rolled stones, composed of crystalline or harder sedimentary rocks, that at a slight depth beneath the surface are seen to spread along the valley of the Po, extending to a variable distance from the foot of the mountains, and along the course of the wider and deeper valleys. A deposit of similar character, covered only by a thin skin of vegetable soil, covers the plain of Friuli, from the Piave to the Isonzo, and, in some places at least, forms beds of considerable depth.

2. *Moraine Deposits*.—In a subsequent page the reader will find a brief notice of the geological action of glaciers, where the nature of those masses of mineral matter which are borne down from the upper regions of the Alps to the lower valleys, and are known by the name of *moraines*, is more fully described. At many points in valleys, where from other evidence we know that glaciers formerly extended, mounds of transported matter, including large angular blocks irregularly dispersed through gravel and fine soil, still exist, and at the opening of the great valley on the S. side of the Alps similar mounds appear on a great scale, sometimes forming hills of considerable height. Those which surround the S. side of the Lake of Garda are fully 35 miles in length, and some of them, as that of Solferino, are nearly 500 ft. in height. These ancient moraines have been carefully studied by excellent geologists, such as MM. Studer, Escher, Guyot, Martins, Gastaldi, De Mortillet, &c., and their conclusion that these masses are true moraines, which must have been deposited in their present position by glaciers that once descended to the plain, is now generally accepted by geologists. Important consequences have been made to turn upon the question whether or not the ancient Alluvium owes its origin to the same operation which transferred the great moraines from the upper ridges to the foot of the Alps.

In support of the affirmative opinion, it has been urged that the materials of the Alluvium and those of the moraines are identical in composition, the main, if not the only difference being that the former have undergone the action of water, while the latter remain in their original position. An intermediate condition, where the materials of a moraine have been attacked by streams and partially stratified, is occasionally seen, and has been appealed to in evidence.

Those who affirm the existence of an essential difference between the

Alluvium and the moraine, point out various characters by which it is thought that they may be distinguished. The Alluvium is composed of rounded blocks of moderate size, never striated, never mixed with earth, and lying in a position of stable equilibrium. The whole mass shows more or less traces of stratification, and the materials are sorted stones of about the same size usually lying together. In the ancient, as in modern moraines, the materials are worn pell-mell; they include angular blocks, with edges little or not at all worn, and the smaller stones are often scored and striated. The greatest stress is laid upon the fact that the moraines are constantly found resting upon the ancient alluvium which must have been deposited in its place, and in some degree consolidated before their arrival.

3. *Glacial Silt*.—The action of glaciers in pulverising the underlying rocks and transporting the materials to a distance in the form of extremely fine mud, has been referred to in Art. XIII. (On Glaciers). Accurate measures are wanting to show the amount of solid matter thus annually transported from the Alps to the lower valleys, to the bottom of lakes, and to the sea. Whatever that amount may be, it must have been much greater during the period when all the valleys of the Alps were traversed by glaciers, and an extent of surface was exposed to the grinding action of those glaciers 20 or 30 times as great as the beds of existing ice-streams. A large share of this deposit must have been carried into the valley of the Po, and when beyond the reach of the ancient Alluvium this must be the chief constituent of the subsoil. Researches are yet wanting into the extent of the deposit, but they may hereafter throw some light on the history of the so-called Glacial Epoch.

RELATIONS BETWEEN THE GEOLOGY AND THE OROGRAPHY OF THE ALPS.

The aspect of a mountain country is mainly determined by the nature of the valleys and depressions of the surface. In considering the causes which may have operated in giving its actual form to the chain of the Alps, it is desirable to point out that the valleys may be reduced to three types having a very different geological significance, and that the passes, or *cols*, which present a marked break in the continuity of the range also partake of the characteristics of some one of these types.

The three types to which the *Valleys of the Alps* may be reduced, are valleys of disruption, valleys of outcrop, and valleys of depression.*

Valleys of Disruption are evidently produced by rents that have torn asunder ranges once continuous. The ordinary character of such a valley is that of a narrow defile, enclosed between steep walls of rock, and traversed by a torrent which often leaves little room for a passage. The harder the rocks through which it lies, the steeper are the walls. When they are formed of soft strata the common causes of destruction act upon them, and the opening is enlarged, but the essential character remains the same. To the eye of the geologist, it is always recognisable by the correspondence of the strata on the opposite sides of the valley.

* The French terms used by the Author are respectively *cluse*, *combe*, and *maïte*. There being no exact English equivalents, the Translator contents himself with explaining the Author's meaning, without attempting to coin new terms to express it.—[Ed.]

To this type of valley belong most of those famous for the boldness of the scenery. Well-known examples are the valley of the Rhone between Villeneuve and Martigny, and that of the Arve between Cluses and Salanches, the valley of the Hinter-Rhein above Coire, including the famous defile of the Via Mala, and the middle part of the valley of the Salza. Examples are still more numerous on the S. side of the main chain, in the tributary valleys of the Po.

Valleys of disruption are less common amongst the crystalline masses of the Alps than in the sedimentary strata. Few instances can be cited in the central Alps, save the valley of the Reuss from Fluelen to Andermatt, partly traversing stratified, and partly crystalline rocks, the valley of the Tessin, lying altogether through the crystalline nucleus of the Tessin Group, and the course of the Dora Baltea from Chatillon to St. Martin. The crystalline group of the Belledonne in the Western Alps, is cut through by four valleys of disruption, those of the Romanche, Arc, Isère, and Doron. It will be remarked that of all the crystalline masses of the Alps that of the Belledonne is one of the longest and narrowest.

The numerous cases of clefts which have cut into, without cutting through a mountain range, must not be confounded with true valleys of disruption, although they sometimes produce very similar effects on the scenery.

Valleys of Outcrop.—By this not very intelligible name we designate the type of valley which is formed parallel to the line of strike of a mountain range, either owing to a disruption of continuity, or to denudation which has acted extensively upon one deposit, while the under or over-lying strata have been comparatively unaffected. Such a valley usually occurs along the line of junction between crystalline or other hard rocks, and softer strata. The only example, if such it be, of a valley of this description lying altogether amidst crystalline rocks is the middle portion of the valley of the Adda, between its source and the Lake of Como. Many of the greater valleys of the Alps belong to this type, as, for instance, the upper valley of the Romanche, a portion of the valley of the Rhone, the valley of the Inn from Landeck to Innsbruck, the Pinzgau, and the Gail Thal. The essential character of these valleys is their want of symmetry. A traveller passing through one of them will constantly find himself proceeding along the line of outcrop of some formation, with the older rocks on the one hand, and the newer on the other.

Valleys of Depression.—These valleys, which have far greater geological importance than those above described, have been spoken of in the first portion of this essay, under the name of *troughs*. They are depressions between adjoining crystalline masses, characterised by the synclinal disposition of the strata. It not rarely happens, however, that there is great difficulty in tracing the original synclinal stratification. These depressions usually give evidence of excessive lateral compression, and the strata comprised within them have often been set vertically on end, and sometimes reversed in position. There is often evidence that the valley has been in great part formed by denudation, the less resisting strata having been first disturbed and then removed. This process would naturally be intercepted where the rocks are more compact, and in this way we have geological troughs, whose limits do not coincide with those of the existing valleys. Thus the Urseren: that is a valley of depression, but the geological trough which it represents

is continuous to the E. and W., though the rocks, being here harder, form the ridges which are traversed by the Oberalp and Furka passes.

There are other cases in which there is neither depression nor synclinal stratification, but where the presence of fragments of stratified rock between adjoining crystalline masses is evidence of what may be called an ideal trough, which has for the geologist the same significance* as if the trough were a real one. We have examples of this in the metamorphic rocks of which considerable fragments are seen in the space between the crystalline group of Monte Rosa, and the Valais Group, and which rise to a great height in the Matterhorn and other high peaks of that district.

It must be admitted that cases sometimes occur where it is difficult to classify a valley under any of the types above described. The valley of the Rhone above Martigny is in part a valley of outcrop, but instead of following the course of the softer strata, it cuts at an oblique angle the beds of harder rock near the Baths of Saxon.

The greater number of the passes of the Alps belong, geologically speaking, to the type of troughs. They correspond to depressions between adjoining crystalline masses, which may probably have been reduced in height by denudation, as the sedimentary strata which once filled the gap have been removed more easily than the adjoining crystalline rocks. Two exceptions will occur to Swiss travellers. The passes of the St. Gotthard and the Simplon both lie across the axis of a crystalline group. In the first case it seems natural to admit that the break in the continuity of the range, which is indicated by the pass, is not unconnected with the deep rents that traverse the contiguous crystalline masses, and form the valleys of the Reuss and the Tessin. The Simplon Pass is similarly connected with the valley of the Doveria, making a deep rent in the crystalline nucleus, and the pass with its approaches may be considered as an imperfect valley of disruption.

The *Lakes of the Alps* may, in a similar way, be classified by the character of the valleys in which they lie.

To the first class belong the Lakes of Thun, Como, and Iseo, and the Traunsee, Attersee, and Tegernsee in the German Alps. To the second class, characterised by the contrasted scenery of their opposite shores, may be referred the Lakes of Brienz and Wallenstadt.

Of the third class it is not easy to cite any well-known example. The only instances that occur are some small lakes in the Sentis, and the Mond See in the Salzkammergut.

Two other classes of lakes may be mentioned. Of one of these, which may be called Lakes of Erosion, there are examples only on the skirts of the Alpine chain. Such are the Sempacher See, the Chiem See, the Wurmsee, and probably the Lake of Constance.

The last class of lakes requiring notice are Moraine Lakes. These are lakes near the mouths of certain valleys. They owe their existence solely to the waters being retained by the remains of ancient moraines. Several small lakes in Piedmont belong to this category, and most of the larger Italian lakes probably owe their present form and dimensions to moraines that have raised the water above what would otherwise be its natural level.

Some of the larger lakes of the Alps are formed by the union of several

* This opinion of the Author is not likely to pass unchallenged by geologists.—[ED.]

distinct valleys belonging to different types. The Lake of Lucerne, for instance, lies in a valley of disruption from Fluelen to Brunnen, in a valley of depression between Brunnen and Bürgen, and in a valley of erosion at the end near Lucerne.

Small lakes, or tarns, such as are seen at the summit of many passes of the Alps, lie in mere accidental depressions or undulations of the surface.

SKETCH OF A GEOLOGICAL HISTORY OF THE ALPINE REGIONS.

A complete history of the portions of the earth's surface now occupied by the Alps would extend back to a period long antecedent to the existence of a mountain chain. Before that period a succession of distinct genera and species of animals and vegetables lived and perished on ground that sometimes remained for ages at the bottom of a deep sea, sometimes was raised to about the sea-level, being alternately estuary, or marsh, or freshwater lake, and may sometimes have remained at a higher level where the remains of organised life are with difficulty preserved.

In the present brief sketch we shall merely glance at this early phase of the history of the Alps, before passing to the period of their final upheaval.

Period preceding the Upheaval of the Alps.

Without attempting to penetrate the obscurity that rests over that portion of the early history of the earth where no fossil remains have yet been found to guide the geologist, it will be sufficient to note the existence of evident traces of the earliest fossiliferous formation in the Eastern Alps. Elsewhere the Silurian rocks are found in continuous masses, covering a wide area, and it is highly improbable that they should have been deposited in the Alps only in the few places where they have yet been identified. This consideration has led to the conjecture that the metamorphic rocks so extensively developed in the central region of the Alps may be, at least in part, the representatives of the Silurian formation. In their existing condition it is little likely that satisfactory evidence will ever be forthcoming to enable us to attribute these metamorphic rocks to their true place in the geological scale. In the absence of fossils we have no means of distinguishing them from the older azoic sedimentary rocks. Some geologists are inclined to believe that a large portion even of the so-called crystalline rocks of the Alps may be merely old stratified rocks in a highly altered condition. The only source from which positive evidence is ever likely to arise is from the occasional discovery of organised remains. It should be generally known to Alpine travellers that the rudest traces of animal or vegetable life seen in any of the crystalline or semi-crystalline rocks may be of the highest value to geologists, and should, therefore, be carefully preserved with a note of the exact position where they may be found.

During the incalculable lapse of time occupied by the Silurian and Devonian Periods, and the deposition of the Mountain Limestone, we have no evidence that the surface whereon the Alps now stand approached or rose above the sea-level. The first distinct evidence to that effect presents itself when we find that some portions of the Alps, in common with other large districts of our continent, produced that abundant vegetation that has been preserved in the Coal Measures. We have already seen that these are present in many of the interior valleys, especially in the Western Alps.

However long a time may have been occupied by the deposition of the Coal Measures, it was short in comparison with the succeeding period, during which the sea probably again covered nearly the entire area. This appears to have been the prevailing condition from the date of the deposition of the upper portion of the Coal Measures to the commencement of the Lias. There is reason to believe that the latter epoch was preceded and accompanied by considerable oscillations of level, and that from thence we may date the commencement of a continuous barrier of dry land, separating the seas that flowed on its north and south sides.* The labours of the Italian geologists, and especially those of M. Stoppani, have brought to light the contrast which exists between the earlier rocks, whose fossils on both flanks of the chain are identical, and those from the Lias upwards, which throughout the remainder of the Secondary Period present marked differences in their fossil remains on the opposite side of the Alps.

That the change of level throughout the Secondary Period was in the main one of continuous elevation, is rendered probable by the disposition of the strata, which usually succeed each other with tolerable regularity. But it is certain that great oscillations of level frequently recurred, and from the complete absence of some important deposits in one or other part of the chain, we infer the probability that the same tract which at one time was raised above the sea-level was subsequently submerged during the deposition of a succeeding formation. As illustrations of this conclusion we may cite the absence of the Superior Oolite in the Tyrol and Grisons, that of the Upper Greensand in the Swiss Alps, and that of the Oolite and Cretaceous rocks in South Savoy.

The commencement of the Eocene Period was marked by considerable changes of level, and especially by the depression of the valley of the Stura between the Cottian and Maritime Alps. The opening of a strait, communicating between the narrow sea on the N. side of the chain and the wide expanse extending at least as far as from the Alps to Africa, led to an assimilation of the marine fauna and flora of this period on the opposite sides of the chain.

The Miocene Period was marked by a further depression of the low country on either side of the range of the Alps. The plain of Switzerland was submerged to a depth which permitted the accumulation of vast masses of conglomerate and of Molasse, and at the eastern extremity of the Alps the sea reached districts which apparently had not been touched by it since the Palæozoic Epoch, and formed the deposits of Molasse, which we still see in the valleys of the Mur and the Drave, in the valley of Lavant, &c. To judge from the organic remains of the Miocene Period, the conditions of life were not then widely different from those that now obtain in the same region. The climate seems to have been slightly warmer, corresponding nearly to that of central Italy.

Epoch of the Final Upheaval of the Alps.

We have seen that at a remote geological period some portion of the Alps was uplifted from the bed of the sea, and that certain small districts may

* To the same epoch may probably be referred the first formation of the basin of the Valley of the Po, caused by the upheaval of a continuous series of crystalline masses, extending in a circular arc from the Ligurian Apennine to the group of the Adula—an operation which, as M. Studer has pointed out, appears not only in the general form of the mountain masses, but in the direction of the stratification in the separate portions of the chain.

probably have subsisted since that time as islands, but that the formation of a continuous range, capable of forming a barrier between the sea to the N. and that on the S. side, probably dates from an early portion of the Secondary Series. This suffices to show that it is an error to speak of the *upheaval of the Alps* as if it were a single geological event, accomplished by an agency which continued to operate from the time when it commenced to the period of its completion. It is nevertheless true that the final period of upheaval, commencing after the deposition of the Miocene strata, is that which gave to the Alpine chain its existing form. Although many of the folds and undulations of the surface appear to date from this recent period, there is reason to think that the main features of the physiognomy of the Alps were already defined, and that the chief change was to increase very much the mean height of the entire chain. In the Rigi, and other exterior mountains of Northern Switzerland, we find the Miocene rocks raised to a height of nearly 6,000 English feet above the sea-level; so that we are led to infer that the amount of upheaval in this latest period nearly equalled the combined effects of all the antecedent periods of elevation.

Considering the extent and importance of the changes effected in recent times, and the copious evidence of them that is forthcoming in most parts of the Alps, it is not surprising that geologists have given more attention to this than to the earlier oscillations of level, and have sometimes spoken of the final, or *Post Miocene*, upheaval, as if it were, in an exclusive sense, *the period of upheaval of the Alpine chain*. To this period seems especially to belong the fissures, which are seen to traverse all the formations, from the most ancient to the most recent—sometimes forming valleys of disruption, sometimes lesser indentations in the chain, and which may without difficulty be distinguished from the mere action of streams that have, not unfrequently, deepened the channel of a pre-existing fissure.

It is clear that a series of changes, which included the rupture of mountain masses and disturbances of stratification, that led to the actual reversal of the natural position of the beds, could not have been accomplished without a corresponding disturbance of the conditions of animal and vegetable life. It was natural that the theory which affirmed a connection between the upheaval of mountain chains and the transition between the fauna and flora of successive geological epochs, should seek a confirmation of that conclusion in the Alpine region, whose elevation has had so vast an influence on the destiny of our continent.

If the organised creation was not entirely destroyed by so great a catastrophe, it is at least certain that in the centre and north of Europe it was connected with very great changes in the relative distributions of land and sea, and with that general emersion of a large portion of our continent, both north and south of the Alps, that marked the passage from the Tertiary to the present period. These changes of themselves imply the destruction or displacement of vast numbers of species, and the substitution of others in their place.

The study of all the phenomena connected with the upheaval of the Alps on the north side of the main chain, led geologists to establish with great certainty two conclusions. First, the extensive disturbance of the Miocene strata, seen to rest conformably on the older Tertiary rocks, proved that the upheaval commenced after the deposition of the Miocene. Secondly, the

close conformity of the channels of the ancient glaciers with the existing form, and the relative level of the surface, show that the period of disturbance must have ceased before the Glacial Period. But during the long interval between these two geological dates, occupied elsewhere by the deposition of the whole mass of the Pliocene strata, there was nothing to fix the epoch of upheaval.

The Pliocene formation, as we have already seen, has not been traced on the north side of the Alps, but has lately been recognised at the southern base of the chain in a few isolated stations. Had the formation been more fully developed, if it were possible to compare the stratification with that of the older Miocene deposits, we should be able safely to conclude whether the upheaval had preceded or followed its deposition. The negative evidence, which as yet is all that is forthcoming, points to the former inference; but this does not justify any positive decision.

It is well known that the greater part of the Apennines have been upraised since the deposition of the Pliocene, whose beds are often seen tilted up at a high angle. For the present it must remain uncertain whether the last great upheaval of the Alps, and the elevation of the Apennines, were not contemporary events.

Glacial Period.

As we have already seen, the relative level of the different portions of the Alpine chain has undergone no considerable change since the close of the Tertiary Period. Events not less interesting and important have occupied this latest portion of the history of the Alps, which is marked by the extraordinary extension of the glaciers.

It is impossible here to enter into any detail of the evidence upon which the present conclusions of geologists have been based, and still less to refer to the prolonged discussions to which at every step they were subjected—discussions which ultimately served to establish the new theory upon fuller enquiry, and more decisive proof, than if it had been more easily accepted.

In the brief description which has been given (Art. XIII.) of the phenomena of existing glaciers, it has been shown that amongst other operations they transport large quantities of mineral matter from the upper ridges of the Alps to the lower valleys; that this transported matter consists in part of large blocks, partly of smaller stones and gravel. It was seen that a portion of these blocks are stranded upon the bank of the glacier, while others are carried down to its lower end, where, if the shape of the ground be favourable, and the glacier remain long enough stationary, they enter pell-mell, along with the rest of the transported materials, into the formation of a terminal moraine. Again, it was seen that by the passage of a glacier, the bottom and sides of the valley are subjected to a peculiar process of smoothing and polishing, that leaves its tokens permanently impressed on the general form of the rocks, and on the condition of their surface.

Finally, it appeared that the pressure of the glacier against the bottom and sides of the valley reduces the rocks and gravel that find their way to the bottom partly to fine mud, and partly to flattened pebbles, scored by the friction they have encountered in the rocky bed of the glacier.

It was long known that blocks of stone, sometimes of great dimensions, and composed of rock utterly different from that of the district in which

they are found, are scattered through the lower parts of the main valleys of the Alps, and over the low country at their base. Such blocks, with their edges still fresh, and without trace of violent transport, are seen resting on steep slopes. Further enquiry showed that in the places where these blocks were deposited, the rock *in situ* is often rounded and grooved—nay, even, that when hard enough, it has preserved the finer striæ and polish which we see under the beds of existing glaciers. One after another the moraines, the glacial mud, and the scored pebbles, were discovered at vast distances from the present limits of the glaciers, but associated with the distribution of the erratic blocks, and these appearances were shown not to be confined to the Alps, but to be equally distinct in other mountain districts, as, for instance, in our own islands, during the same recent geological period.

Sustained by able and zealous supporters, foremost amongst whom must be reckoned the late M. Charpentier, the theory which accounted for the dispersion of the erratic blocks by the agency of extinct glaciers, encountered much opposition. It has perhaps suffered more from the exaggerations of some of its supporters than from the criticism of its opponents. At present the original controversy is nearly set at rest. The absolute identity of the operations of existing glaciers with the facts traceable throughout the Alps, and other mountain countries, has overcome the reluctance of many eminent geologists to admit the new theory, and the former extension of glaciers over a wide area in the Alps, and elsewhere, is now one of the admitted data of geological science.

The evidence is in some respects more complete and convincing on the southern than on the northern side of the Alps; and it is probable that if the phenomena had been sooner studied in that region, the period of resistance to the new theory would have been abridged. It has been fully proved that nearly all the secondary valleys that open into the valley of the Po were traversed by great glaciers which extended down as far as the opening of the valley, and in some instances were protruded into the plain. The greatest of these was the glacier of the Adige, which filled the basin now occupied by the Lake of Garda, and after a course of about 170 miles, left in the plain S. of the lake a series of terminal moraines, extending in an arc 35 miles in length, and in some places attaining a height of fully 500 feet.

On the north side of the Alps the area occupied by the ancient glaciers was even more extensive. The glacier of the Rhone, with a vast number of affluents poured into it from the tributary valleys of the Pennine and Bernese Alps, not only filled the basin of the Lake of Geneva, but covered a great portion of the plain of Switzerland, and reached to a considerable height on the flanks of the Jura.

A map showing the distribution of the erratic blocks in Switzerland has been published by M. Escher von der Linth; a similar map, including the Alps of Lombardy and a part of Piedmont, accompanies a memoir by M. Omboni in the 2nd volume of 'Atti della Società Italiana di Scienze Naturali.'

In the 3rd volume of the Acts of the same society, M. G. de Mortillet has published a more complete map of the ancient glaciers of the Italian side of the Alps, with an interesting memoir, in which he discusses at length various questions to which in this brief essay it is impossible to do justice. The latest speculations upon the part played by glaciers in the past history of the Alps lead to conclusions that have not as yet gained the general agree-

ment of geologists. M. de Mortillet, M. Gastaldi, and other distinguished Italian geologists, hold that during the period preceding the utmost extension of the glaciers, the Italian lakes were filled with the waterworn materials that constitute the so-called ancient alluvium, and that the cavities so filled were scooped out by the action of the glaciers when they descended into the lake-basins. Other theorists, and amongst them an eminent English geologist, Mr. Ramsay, have gone farther still, and have sought to prove that the ancient glaciers were competent not only to clear out the bed of a lake, supposing it filled with alluvium, but to excavate the rock-basin itself. When we recollect the depth of the Italian lakes, which vary from 900 feet in the Lake of Lugano, to over 2,600 feet in the Lago Maggiore, we feel that more cogent evidence than any yet produced is required before we can admit the probability of even the more moderate of these hypotheses. The subject is interesting from its novelty as well as its geological importance; but, pending its further discussion, we concur in the objections to the new theories urged by Mr. Ball in an article in the 'Philosophical Magazine' for February, 1863, and we continue to regard the extension of the so-called ancient alluvium as one of the series of phenomena which accompanied the former extension of the glaciers. On somewhat similar grounds we must refuse our adhesion to the supposed operation of glaciers in the excavation of the valleys of the Alps, while we admit the probability that the action of ice has had a large share in modifying, along with other agents, the details, and shaping the minuter features, of the surface of the Alpine valleys.

Notwithstanding the labour that has been bestowed by geologists upon the study of the glacial period in the Alps, there remain many branches of enquiry which are far from being exhausted. One of these relates to the probable oscillations in the extent of the glaciers. The great moraines which are so remarkable on the S. side of the Alps prove that the glaciers must have remained for a long period at or about the limit which they indicate, and that that limit has not since been surpassed, but this does not imply that at an earlier date the great ice-streams may not have flowed farther into the plain, without remaining long enough to leave such moraines as would survive to the present period. One of the difficulties found in studying the glacial phenomena in that region arises from the fact that during the period of the retirement of the glaciers, and since that time, the materials of the ancient moraines have been constantly attacked by torrents, sometimes transported to a distance, and partially stratified. The region of ancient moraines along the southern base of the Lombard Alps is extremely interesting from its diversified scenery, and the small lakes formed by the mounds of moraine matter add much to its beauty; but laborious and patient study is necessary for those who would unravel the phenomena.

Another branch of enquiry connected with the same subject regards the effects of the glacial period in the Alps upon animal and vegetable life. It is probable that at the period of the utmost extension of the glaciers, life had ceased to manifest itself, and that the present fauna and flora began to appear on the flanks of the chain, only as the glaciers retired to the upper valleys.

Among the mammalia whose remains belong to that period are a few now extinct species. There is nothing to show that the new inhabitants appeared simultaneously, but some reason to hold the contrary opinion. The fish, insects, and mollusca, that inhabit the Alpine lakes could have made their

appearance only after these were clear of ice, a period which must be separated by a long interval from the commencement of the retirement of the glaciers. Amongst the latter species are several that are peculiar to these lakes; and those who are averse to admit the theory of special creation have not yet satisfactorily accounted for the appearance of these animals within so recent a period.

On the questions concerning the antiquity of man, which now so much interest geologists, the glacial deposits of the Alps have hitherto been silent, and there is nothing to show whether the earliest human inhabitants may have witnessed the presence of great glaciers in the lower valleys of the Alps.

AUTHORITIES TO BE CONSULTED ON THE GEOLOGY OF THE ALPS.

Readers who may wish for fuller information respecting Alpine geology will find much matter of a general character in the works of Saussure, Schlagintweit, Forbes, Agassiz, and Desor, already enumerated in Art. XIII. The following list includes most of the more important works and memoirs on the subject, recently published, along with a few of earlier date, and a notice of the geological maps most useful to the student.

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- Sonklar (K. von) Uebersichtskarte des Oetzthaler Gletschergebietes, $\frac{1}{144000}$ Perthes, Gotha, 1860 (an excellent map).
- Pauliny (J. J.) Relief Karte der Orteler Spitze, $\frac{1}{72000}$, mit 2 Karten und Text, Wien, 1861.
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SUPPLEMENTARY NOTES.

TOURS IN THE WESTERN ALPS.

The following tours may be of service to those who are but slightly acquainted with the country, and wish to be directed to the places whence the finest scenery is most conveniently accessible. It is taken for granted that some days (the more the better) will be given to halts at the more interesting spots included in each tour.

I. Carriage Tour in the Western Alps—30 days' easy travelling, exclusive of halts, railways, and boats being occasionally used.

AIX LES BAINS.

1. Excursion by boat to Haute Combe
2. Rail to Chambéry. Carriage to Grande Chartreuse
3. Carriage to Voiron. Rail to Grenoble
4. Carriage to Allevard
5. Char to Chamousset. Rail to St. Jean de Maurienne, or St. Michel
6. Carriage to Lanslebourg, or Susa
7. Turin
8. Rail to Cuneo. Carriage to Baths of Valdieri
9. Return to Cuneo. Carriage or rail to Saluzzo
10. Char to Paesana, Barge, and La Tour de Luserne
11. Turin by rail from Pignerol. Carriage by Lanzo to Ceres
12. Return to Turin. Rail to Ivrea
13. Carriage to Aosta. Char to Courmayeur
14. Return to Aosta
15. Carriage to Ivrea. Char to Biella
16. Char to Varallo, by Romagnano
17. Excursion to Val Mastalone, returning to Varallo

18. Orta by new road to Pella, or by Romagnano and Borgo Manero
19. Carriage to Arona, and thence to Suresa or Baveno
20. Carriage to Ponte Grande or Vanzone
21. Carriage to Domo d'Ossola
22. Carriage to village of Simpeln
23. Carriage to Susten. Char to Baths of Leuk
24. Carriage to Sion. Rail to Bex
25. Excursion to Champéry Villeneuve
26. Geneva by steamer, or by road as far as Vevey
27. Carriage to Samoëns
28. Excursion to Sixt and Fer-à-Cheval
29. Carriage to Chamouni by Tanninges
30. Carriage to Geneva.

Those who have seen the Pass of Mont Cenis may vary the above route by returning from Allevard to Grenoble, and travelling to Turin by Bourg d'Oisans, Col du Lautaret, Briançon, Mont Genève, and Susa; or, avoiding Susa, they may reach Turin by Fenestrelle and Pignerol.

II. Tour of three months in the Western Alps, for moderate pedestrians or ladies able to ride. Alternative routes given in italics are practicable only on foot.

AIX LES BAINS.

1. Grande Chartreuse as above, or by Mont du Chat, St. Genix, and Pont de Beauvoisin
2. Grenoble by Sappey
3. Carriage to Bourg d'Oisans. Mule-path to Venos
4. Excursion to La Bérarde, returning to Venos

6. Path to Bourg d'Oisans. Carriage to La Grave
7. Monestier by Col du Lautaret
8. Mule-path to Ville Vallouise by Col de l'Echauda
9. Carriage to Embrun
10. Barcelonnette by Valley of the Ubaye, or by Col de l'Eyslette
11. Bersesio by Col d'Argentière

12. Mule-path to Vinadio. Char to Borgo San Dalmazzo. Carriage to Baths of Valdieri
13. Carriage to Cuneo
14. Carriage or rail to Saluzzo. Carriage to Paesana
15. Excursion to Crissolo and Piano del Re, returning to Paesana
16. Char by Barge to La Tour de Luserne
17. Mule-path by Val Angrogna to Perouse. Carriage to Fenestrelle. Mule-path to Susa
18. Rail to Turin. Carriage to Lanzo and Ceres
19. Ceresole by Col della Crocetta mule-path
20. Mule-path to Val Savaranche by Col de la Croix de Nivolet
21. Mule-path to Villeneuve. Char to Courmayeur
22. Ascent of Mont de la Saxe or *Cramont*
23. Mule-path to Chapiu
24. Mule-path to St. Gervais
25. Char to Sallanches, Cluses, Tanninges, and Samoëns
26. Char to Fer-à-Cheval, returning to Sixt
27. Mule-path to Servoz by Col d'Anterne
28. Mule-path to Brévent, descending to Chamouni
29. Mule-path to Montanvers, returning to Chamouni by Chapeau
30. Mule-path to Tête Noire or Col de Balme
31. Mule-path to Orsières by Col de Champey
32. Char to St. Pierre. Mule-path to Grand St. Bernard
33. Mule-path to St. Remy. Char to Aosta
34. Carriage to Châtillon. Mule-path to Brusson and Gressonay
35. Mule-path to Alagna by Col d'Ollen or Col di Val Dobbia
36. Mule-path and char to Varallo
37. { Ponte Grande by Pella and Orta, thence by
38. { Monte Motterone, Baveno, and carriage to Vogogna, or by Fobello, and Barranca Pass
39. Mule-path to Macugnaga. Excursion to Belvedere
40. { Return to Ponte Grande. Char to Domo d'Ossola. Carriage to Brieg. Same to
41. { Visp, and mule-path to St. Niklaus, or
42. { by Pass of Monte Moro from Macugnaga to Mattmark See. Visit to Fee, and sleep at Saas; thence to St. Niklaus
43. Mule-path to Zermatt
44. Excursion to Gorner Grat
45. Excursion to Schwarz See and Zmutt
46. Return to St. Niklaus
47. Mule-path to Visp. Carriage to Sierre
48. Mule-path to Zinal
49. { Mule-path to Evolena by Col de Sorebois and Col de Torrent. Evolena to Sion,
50. { or mule-path to St. Luc, and ascent of Bella Tola; descending next day to Sierre. Carriage thence to Sion
51. Rail to Bex. Mule-path to Plan des Isles
52. Mule-path to Château d'Oex
53. Vevey by Montreux and Plan de Jaman
54. Steamer to Geneva

III. Pedestrian Tour of two months in the Alps of Dauphiné, South Savoy, and Western Piedmont, occasionally putting up with very bad accommodation.

1. Lyons to Grande Chartreuse. Ascend Grand Som
2. By Col de Manival to Bernin. Thence to Domène and Baths of Uriage
3. Visit Cascade de l'Oursière. Sleep at Revel
4. Ascend Belledonne, descending to Sables and Bourg d'Oisans
5. { To Venos. Next day to La Bérarde; and
6. { on the following day, by one or other of the glacier passes, to Ville Vallouise, or
7. { by La Grave, Monestier and the Col de l'Echauda
8. Ville Vallouise to Queyras, or Villevielle, partly by char
9. Sleep at chalets of La Ruine under Monte Viso
10. Pass of the Traversette to the Piano del Re, thence by Col delle Sagnette and Val Forcellina to Castel Delfino
11. By Col della Bicocca to Stroppio, and thence to Acceglio
12. To Barcelonnette by Col de Sautron
13. To Allos, with excursion to the Lac d'Allos
14. To San Stefano in the Valley of the Tinea
15. To Baths of Valdieri by the Col di Fremà Morta
16. Ascend Monte Matto
17. To S. Martino di Lantosca by the Col delle Ceresè
18. To Cuneo by the Col delle Fenestre and Entracque
19. Railway to Saluzzo; thence to Crissolo
20. La Tour de Luserne
21. To Susa, by Val Angrogna and Col de la Fenêtre
22. To Bardonnèche. Visit tunnel through the Alps
23. Ascend Mont Tabor, descending to Modane
24. To Pralognan by the Col de Chavière
25. To Lanslebourg by Col de la Vanoise, thence to Ancienne Poste on Mont Cenis by the evening diligence
26. Make circuit by Petit Mont Cenis and Col du Clapier, returning to the Ancienne Poste
27. By Bessans to Bonneval
28. To Ceres in Val Grande, by Col de Girard
29. To Viù by Col di Cialmetta
30. Sleep at Malciaussia
31. Ascend Rochemelon; descend to Bessans, or to the Ancienne Poste on Mont Cenis
32. To Bonneval
33. To Ceresole by Col de Carro, or Col de Galèse
34. Descend Valley to Ponte
35. To Cogne by Col della Nouva, or by Col de Bardonney
36. Excursion to Le Poucet
37. To Val Savaranche by Col de Lauzon
38. To Aosta. Sleep at Châlets de Comboë
39. Ascend Becca di Nona, and reach Cogne by Col d'Arbole
40. By Villeneuve and St. Didier to La Thuile
41. Ascend Ruitor, descending to Ste Foi. The traveller may then reach Chambéry by the valley of the Isère, or Geneva by Albertville, and the Lake of Annecy.

IV. Pedestrian Tour of two months in the Pennine Alps.

1. Macon to Chambéry and Chamousset by railway. Thence by diligence to Albertville; then walk, or by char, to Ugine
2. Megève
3. Ascend Mont Joli. Descend to St. Gerlaise
4. To Sixt by La Portelle
5. Visit Fer-à-Cheval. Sleep at Les Fonds
6. Ascend the Buet. Descend to Chamouni by the Brévent, or by Pierre à Bérard
7. Visit Cascade du Dard and Glacier des Bossons
8. Tour of the Aiguilles by the Pierre à l'Echelle. Sleep at Montanvert
9. Visit Jardin. Return to Chamouni
10. To Contamines by the Col de Voza
11. Excursion to Glacier de Trélatête. Sleep at the Pavillon
12. Courmayeur by Col de Trélatête
13. Ascend Cramont
14. Ascend Grand Rossère, and sleep at Hospice of Great St. Bernard
15. Visit neighbourhood of the Hospice
16. Ascend Mont Vélan. Descend by Col de Menouve to Etroubles
17. By Col de Fenêtre to Châlets de Chermontane
18. Ascend Mont Avril
19. Chermontane to Prarayen by Col de la Reuse de l'Arolla
20. Zermatt by Col de la Val Pellina
21. Visit Schwarz See and Hörnli
22. Ascend Mettelhorn
23. Visit Gorner Grat. Sleep at Riffel Hotel
24. To Breuil by Col de St. Théodule
25. To Ayas by Cimes Blanches, or by Col de Portola
26. To Gressonay by Col de Pinta. Ascend Grauhaupt
27. Visit Lys Glacier. Sleep at Cour de Lys
28. To Alagna by Col delle Piscie, or by Col d'Ollen
29. { To Ponte Grande by Col de Moud, Rimasco, and Carcoforo, or by Varallo,
30. { Fobello, and the Barranca Pass
31. Macugnaga
32. Tour of Macugnaga Glacier
33. To Mattmark See by Monte Moro
34. { To Saas, visiting Fee Glacier, and Gletscher Alp. Next day to St. Niklaus. Following day to Grûben in Turtman Thal. Or by Zwischbergen Pass to Isella. Next day to Brieg by Simplon Pass. Following day to Grûben by Turtman
35. {
36. {
37. Zinal by Pas de Forcletta, and Arpitetta Alp
38. Evolena by Col de Sorebois and Col de Torrent
39. Ascent of Couronne de Bréona, or Aiguille de la Za
40. Sion. Thence by railway to Bex
41. Champéry
42. Ascent of Dent du Midi
43. { To Geneva by Samoëns, or by Thonon
44. { and lake steamer.

The portion of the above tour comprised between Chamouni and Zermatt should not be undertaken otherwise than in company with a trustworthy guide, well acquainted with the country. It is not likely that in a single expedition a traveller should be so favoured by the weather as to be able to make all the ascents here set down.

BOOKS AND MAPS CONNECTED WITH THE WESTERN ALPS.

Of the works specially connected with Mont Blanc, which are numerous enough to fill a small catalogue to themselves, there is none to compare in beauty of execution with Mr. Coleman's 'Scenes from the Snow Fields.' The chromo-lithographic illustrations, which are all taken from scenes actually sketched or painted by the artist on different parts of the mountain, surpass any similar attempts to convey the effect of the colouring of the upper region of the Alps.

Of works of a more portable character, the following may be recommended as in various ways useful or interesting to a traveller.

Professor Forbes. Mont Blanc and Monte Rosa, chiefly extracted from the same author's larger work—'Travels in the Alps, &c.'

Professor Tyndall. Mountaineering in 1861. A slight, but genial little volume, giving an account of two adventurous expeditions in the Monte Rosa district.

- Professor Ulrich. Die Seitenthäler des Wallis und der Monte Rosa topographisch geschildert. Zürich, 1850.
 Rev. S. W. King. The Italian Valleys of the Pennine Alps.
 A. Wills. The Eagle's Nest.
 A Lady's Tour round Monte Rosa.

Those who wish for more detailed information respecting Dauphiné than is contained in this volume, may consult Joanne's '*Itinéraire du Dauphiné*,' of which the second part has just been published (July 1863). The same writer's '*Itinéraire de la Savoie*' contains much detailed information respecting the more accessible districts.

Maps.—Reference is frequently made in this volume to the map of Piedmont, Savoy, and the County of Nice, published by the *État Major* in Turin, before the recent political changes which have merged Piedmont in the new kingdom of Italy, and united Savoy and Nice to France. The map is believed to be generally correct in the lower part of the country, and in the inhabited portions of the valleys, but entirely fails to give a true representation of the Alpine region, and especially of the higher peaks and glaciers. A reduction in 6 sheets has been published, and has from time to time received some corrections. The smaller map answers the purpose of a pedestrian quite as well as the larger one, neither being trustworthy. The French Alps, *i.e.* those of Dauphiné and Provence, are at present in a still more deplorable condition than those of Piedmont. The only map making the least pretence to accuracy is that of General Bourcet, published in 1754. For the period at which it was executed this is a very remarkable work, and bears evidence of having been in great part founded on actual observation, if not on a scientific survey; but it is needless to say that it falls greatly short of the requirements of modern cartography. There is now a prospect that within a reasonable time this extraordinary deficiency will be supplied, and that a map worthy of the scientific reputation of the French *État Major* will be given to the public.

Switzerland has long possessed maps which might be called good, by comparison with those of the neighbouring countries, but this year has seen the completion of a work which is a just subject of national pride. The Federal Map of Switzerland, published under the direction of General Dufour, is a work which is almost faultless, both as to accuracy and as to technical execution, and, considering the difficulties encountered and overcome, must be admitted to be the finest work of the kind ever executed. The entire territory of the Confederation is included in 25 sheets, of which the following contain portions of the districts included in the Western Alps:—17, the lower Valais—E. end of the Lake of Geneva—18, the upper Valais with a portion of the Monte Rosa district, and the Simplon—21, the valley of the Arve—22, the N. side of the Pennine Alps from Mont Blanc to the Matterhorn—23, Monte Rosa and a portion of the Saas district, not extending, however, to the Italian valleys.

Of special maps of particular districts there are not many requiring notice. M. Gottlieb Studer's map of the district lying between the Val de Bagnes and the Simplon was very useful when first published, but is now superseded by the Federal Map.

Professor Alphonse Favre, of Geneva, has recently published a geological Map of a part of the north of Savoy from the valley of the Isère to the Lake of Geneva, including the range of Mont Blanc. To the geologist this is a very valuable work, and in some parts of the district it is an improvement on the Sardinian map, but it is not well executed, nor very well fitted for purposes of the unscientific traveller.

The writer believes that the maps accompanying this volume will be found to be superior in many respects to those that have preceded them, and in several of the more important districts the smaller maps will, it is hoped, supply tolerably well the wants of the pedestrian traveller.

THE
ALPINE GUIDE.

ALPINE GUIDE.



CHAPTER I.

MARITIME ALPS.

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If the reader will cast his eyes upon a map of the region where the great chain of the Alps approaches the shores of the Mediterranean, he will observe that, from a point about 15 miles S. of the Mte. Viso, a number of valleys diverge in many directions, like the spokes of a wheel. These correspond to as many mountain ridges, which do not actually radiate from the same mountain, but which all converge towards the *Mont Enchastraye*, or *Cima dei Quattro Vesco-vadi* (9,747'), a peak lying immediately S. of the Col della Maddalena (§ 2). On the W. and NW. side of that peak are merely short outlyers, between which three mountain torrents run down to the Ubaye, one of the chief affluents of the Durance. To the SW. a much more considerable ridge extends towards the Mediterranean, drained on

the W. side by the Verdon, on the E. by the Var. It will be observed that both these streams are turned from their southward course by the comparatively low ranges of limestone hills which run from W. to E. across the Department of the Var, in France. The Verdon is diverted to the W. till it joins the Durance, while the Var makes a wide bend to the E. till it meets the Tinea and the Vesubia, N. of Nice. Between the head waters of the Var and those of the Tinea, a high range, with two peaks exceeding 9000 feet, extends for about 25 miles nearly due S. from the Mt. Enchastraye. By far the most considerable of the ranges that diverge from that mountain is, however, that which, extending at first SE., and then nearly due E., separates the sources of the Tinea from those of the Stura

It is characterised by an axis of crystalline rocks, which are developed on a large scale; and this circumstance, along with the height of many of the peaks, exceeding 10,000 feet, and the extent of perpetual snow, have obtained for this, rather than any other of the ranges above spoken of, the distinction of being considered the true prolongation of the main chain of the Alps. Extending in a direction parallel to the shores of the Mediterranean, it is ultimately merged in the Apennine which, under one or another denomination, reaches to the farthest extremity of the Italian peninsula.

It is not easy to determine where the limit between the Maritime Alps and the Ligurian Apennine should be fixed. That great master of practical geography, Napoleon, placed the boundary at the pass NW. of Savona, traversed by the road from that city to Mondovì; and there are geological reasons which favour that division, which corresponds to the limit between the miocene and the metamorphosed secondary rocks. The Piedmontese War Department, in a work to which reference must often be made hereafter—*Le Alpi che cingono l'Italia*—adopt the *Monte dello Schiavo*, NW. of Albenga, several miles west of the above-named limit, as the E. extremity of the Maritime Alps. In the present work it is thought better to regard the wants of the class of travellers for whom it is intended, rather than any scientific definition; accordingly, that portion of the chain only is included which, in common parlance, may be called *alpine* in character; namely, that where the height of the mountains is sufficient to maintain considerable masses of perpetual snow. The limit to which that definition applies is exactly fixed by the pass of the Col di Tenda, traversed by the high road from Nice to Turin. E. of that pass the mountains are *Apennine* in character, being covered with vegetation to their summits; while in the opposite direction we at once find that combination of rock and snow, or ice, which we are used to associate with the idea of Alpine scenery. Following the

example of ordinary geographers, we shall place the N. limit of the Maritime Alps at the Col de Longet, connecting the Val Vraita with the Ubaye, immediately to the S. of Monte Viso. The chain connecting that magnificent peak with the Mont Enchastraye supplies, on its W. flank, numerous torrents which feed the head waters of the Ubaye, but in the opposite direction sends out two considerable ridges parallel to the main range of the Maritime Alps. The most southerly of these divides the valley of the Stura from that of the Maira; the other separates the Maira from the Vraita. A much shorter ridge, a mere buttress of the Rioburent, divides the two mountain glens whose combined streams form the Vraita. The western limit of the Maritime Alps is naturally formed by the valleys of the Ubaye, the Verdon, and the Var, taking the W. branch of the latter stream, called La Vare.

It is not, perhaps, generally known that in the close neighbourhood of a place so frequented by strangers as Nice, and easily reached by railroad on its northern side, *viâ* Turin and Cuneo, there is an Alpine range, not indeed rivalling in grandeur the great snow-clad peaks of the central Alps, yet full of wild and varied scenery, and possessing the great advantage of being accessible some weeks earlier in summer, and at least a month later in autumn, than those districts which are not, as this is, directly within the influence of the Mediterranean climate.

SECTION I.

TENDA DISTRICT—VALDIERI.

THE town of Cuneo, or Coni, stands at the SW. corner of the great plain which extends through Piedmont, Lombardy, and Venetia, from the foot of the Cottian Alps to the Adriatic, on a high terrace at the confluence of the rivers Stura

and Gesso. The Stura, running due W. from the Col d'Argentière, or Col della Maddalena, drains the W. extremity of the Maritime Alps; the *Gesso*, with its affluent the *Vermenagna*, carries down the waters from the northern side of the chain lying S. and SW. of Cuneo. Corresponding to the Gesso and Vermenagna are the *Vesubia* and *Roja* torrents, on the S. side of the same range. These do not, however, join their streams; the *Roja*, after a short course of about 35 miles, falls into the Mediterranean at Ventimiglia, where it has formed the political boundary between France and Italy, since the recent dismemberment of the ancient county of Nice, extorted from the king and people of Italy by their generous ally. The *Vesubia*, bending to the W., joins the Var a few miles N. of Nice.

The portion of the Maritime Alps described in this section has its eastern limit at the Col di Tenda, traversed by the high road from Turin to Nice. The only other pass that is at all frequented is that of the *Col delle Finestre*, about 13 miles W. of the Col di Tenda. The intervening portion of the chain rises into several lofty summits, of which the principal are the *Rocca dell' Abisso* (9,193') and the *Mont Clapier*, whose highest peak, the *Cima dei Gelas* (10,433'), is the culminating point of this region.

Excellent head-quarters for exploring this district are to be found at the Baths of Valdieri (Route B), and there is, or was, a well-managed inn at Limone. With these exceptions, the accommodation to be found in these valleys is poor enough. In every village, however, an inn of more or less humble pretensions is to be found; and, though the first impressions may be very unfavourable, the writer [Ed.] has usually obtained food and a bed such as a mountaineer need not despise. The language is, in places unfrequented by strangers, confined to the native dialect, which seems to be intermediate between Piedmontese and Provençal. For those unacquainted with both, French is rather more service-

able than Italian, though neither are generally spoken.

Apart from the advantage of being accessible at seasons when travellers are shut out by climate from most other Alpine districts, this offers special attractions to the naturalist. Within a narrow range may be found a considerable number of very rare plants, several of which are not known to exist elsewhere. The geology is also interesting, and would probably repay further examination. A crystalline axis is flanked on both sides by highly-inclined and much-altered sedimentary rocks, which probably include the entire series from the carboniferous to the cretaceous rocks, in some parts overlaid by nummulitic deposits.

ROUTE A.

TURIN TO NICE—COL DI TENDA.

	Eng. m.	Piedm. m.*	Ital. posts.
Cuneo (railway)	54	35	
Robillante . . .	18½	12	2
Limone . . .	16	10½	1½
Tenda . . .	36½	24	4
Giandola . . .	23	15	2½
Sospello . . .	25½	16½	2¾
Scarena . . .	27½	18	3
Nice . . .	23	15	2½
	224	146	18½
			(from Cuneo)

From Turin to Cuneo, rail in 2h. 40m. four times a day. Mallepost from Cuneo to Nice in 22h.; longer when snow lies on the pass, when it is crossed in carriages laid upon sledges. The long windings of the road make the distance between several of the stages more than double the length of the footpaths.

The railway from Turin to Cuneo runs nearly due S. along the nearly level plain skirting the base of the Cottian Alps, and frequently commanding views of the snowy range crowned by the peak of Monte Viso. For those intending to approach that noble mountain through

* See Introduction. 1 Piedmontese mile = 1½ English mile and 57 yards. 1 Italian post = 8 geogr. miles = 9 Eng. miles and 362 yards.

the valley of the Po, or the Val Vraita, there is a convenient branch-line from the *Savigliano* station to Saluzzo (§ 4).

Cuneo (Inns: Hotel de la Poste—best(?); Barra di Ferro—frequented, pretty good cookery) lies nearly at the head of a narrow inlet from the great plain of the valley of the Po, enclosed on either side by the outlying ridges from the Maritime and Cottian Alps. The fortifications, once thought very strong, were destroyed by the French.

Along the narrow tongue of land separating the Stura and the Gesso, at whose N. extremity Cuneo is built, the high road is carried for about eight miles through level, richly-cultivated ground, to *Borgo S. Dalmazzo*, a large village at the very foot of the mountains, opposite to the junction of the *Vermenagna* torrent, flowing from the S., with the valley of the Gesso coming from the SW. As the high road to Tenda follows the former stream, it here crosses the Gesso above the junction, and commences to ascend the picturesque valley of the Vermenagna, passing *Roccavione*, and the post station of *Robillante*, and, after gradually mounting about 1,500 feet, reaches

Limone (Inns: Hotel de la Poste, at the N. end of the village, is, or was, good and reasonable; two or three other houses appear inferior), the best head-quarters (3,340') for anyone wishing to explore the neighbourhood. It is a walk of about 3 hours (?) across the ridge E. of the village to the *Certosa di Pesio*. This ancient monastery (founded 1173) has of late years been converted into a hydropathic establishment, said to be well conducted (food and accommodation are favourably reported of), in a picturesque position, warmer than the baths of Valdieri, and by some preferred on that account. The Pesio torrent descends into the plain at *La Chiusa*, not far from Cuneo, and the Certosa is accessible by a carriage-road in $2\frac{1}{2}$ hrs. from the railway station.

The pedestrian who may wish to vary the way to Tenda and avoid the beaten

track, has his choice among several other practicable passes, which are, however, very little frequented, and not easily found without a guide. Following a stream which falls into the Vermenagna at Limone, from the SE., it is possible to pass by the *Col di Boaira*, or the *Col di Framosa*, into a branch of the valley of the Roja, called the Vallon di Rio Freddo, which joins the Roja close to the village of Tenda. Besides other rarities, such as *Iberis garrexiana*, *Phyteuma Balbisianum*, &c., the botanist may find the extremely scarce *Moehringia papulosa* on the limestone rocks by a house (? hermitage) scooped out of the face of the mountain on the left side of the valley, about two miles above Tenda.

A more interesting excursion may be made from Limone by following up the main stream of the Vermenagna to its source in a wild glen (called Valle dell' Abisso) under the peak of the Rocca dell' Abisso (9,193'). On the way are many interesting plants—e.g., *Silene campanula*, *Lamium longiflorum*, *Satureja piperella*, *Achillea herba rota*, and *Saxifraga pedemontana*. At the head of this glen is a depression in the chain, approached through a hollow filled with huge fallen rocks and patches of snow, a resort of chamois. Clouds having come on, the writer [Ed.] was unable to ascertain whether the descent on the S. side of this wild pass is practicable. To reach Tenda from thence is not difficult, as, on returning a short distance (less than one hour) towards Limone, a pass is seen on the right hand (? Col della Margaria), approached by steep grassy slopes, which crosses the main chain, and leads down to the high road near the S. foot of the Col di Tenda.

The road from Limone to the pass mounts in long zigzags by a spur of the mountain, which projects between two deeply-cut branches of the main valley. The road on both sides of the pass is narrow, the turns sharp, and in but few places is there the slightest barrier, so that nervous persons should

pass in the dark. There is no real danger with horses used to the work. From one or two points on the N. side the peak of Monte Viso may be seen to the NW., towering over the intermediate ranges. The actual pass (6,158') commands a distant view of the Graian Alps, and leads at once to the long and steep descent overlooking the bare rocky ranges which enclose the head of the valley of the Roja, with a single glimpse of the Mediterranean. There is, perhaps, no other carriage road over the Alps which encounters a continuous slope so long and so steep as that on the S. side of the Col di Tenda—little if at all less than 3,000 feet. This is surmounted by a seemingly endless succession of short zigzags, passing on the way several houses of refuge, which are often needed in winter, when the storms are so violent that neither man nor beast can make way against them. In the last century, the Duchess Anna of Savoy adopted a project, for that period a very bold one, of piercing the mountain by a tunnel two miles in length, at about half the height of the final slope. The works, of which the remains may yet be seen, were interrupted by the French occupation in 1792. At the foot of the long descent, the road follows the stream of the Roja for several miles through a narrow rocky valley, till it reaches

Tenda (Inns: Poste—tolerable for a mountain inn, but not good: there is a rival house—Hotel Imperial(?)) a small village very picturesquely situated under a rock, crowned by the ruins of the castle which once belonged to the unfortunate Beatrice di Tenda. The inferior accommodation, and less agreeable situation, in a hot valley (2,680'), make this a less eligible spot for a halt than Limone; but the neighbourhood is full of interest to a naturalist or geologist. Among other very rare plants to be found on the rocks over the village, *Silene cordifolia*, *Asperula hexaphylla*, *Saxifraga diapiensioides*, and *S. cochlearis*, with *Passerina dioica*,

may be especially noted; the two first are not known to grow out of this district.

Three or four miles below Tenda is a large modern-looking building, now occupied as a hydropathic establishment, once the Abbey of *San Dalmazzo*. The position is hot and confined, and most invalids would in the summer season find Pesio a more agreeable residence. At this point two lateral valleys join the Roja: that on the E. side, leading to the village of *Briga*, is inconsiderable; but in the opposite direction a more copious torrent descends from the *Valle della Miniera*. [About six miles up this valley are the mines known for many centuries, rich in argentiferous sulphuret of lead, and alternately worked and abandoned, as circumstances have rendered them profitable. Near to the works the valley forks. The NW. branch leads to the valley of the Gesso by the *Col del Sabbione* (7,704'); or, following up the torrent to its source S. of the Mont Clapier, to a difficult pass, at least 9,000 feet in height, called *Passo di Valmasca*. (No information as to either of these passes.) The W. branch of the Valle della Miniera leads over a steep ridge to a lateral valley of the Vesubia.]

Below S. Dalmazzo, the high road passes for several miles through a narrow gorge between steep massive walls of igneous (? porphyritic) rock, with here and there an opening which some torrent has cut through the mass. The bold forms of the rocks, and the luxuriant vegetation which crowns every height and fills every hollow, make the scenery of this road worthy to compare with almost any other more famous Alpine pass. The botanist will remark with interest, beside the saxifrages and other Alpine plants that have descended from the surrounding Alps, many species of warmer latitudes, and especially the *Cineraria maritima*, which, save in gardens, is seldom seen except in the warmest situations on the shores of the Mediterranean. Here, between the villages

of Fontan and Breglio, is almost the only *habitat* of the curious plant, *Ballota spinosa*.

Fontan (a poor-looking inn—rather better than it seems) is the frontier village on the new French boundary, where passports are demanded and luggage examined. Below this, on the right, is the opening of the *Val de Caros*, through which the valley of the Vesubia may be reached by the *Col de Raus* (6,572'), leading to Roccabighiera, or by the *Col dell' Ortighera*, by Bollena, to Lantosca. The high road now enters a narrow defile below *Saorgio*, crossing and recrossing the Roja several times, and then following the stream to the post station at

Giandola (Hotel des Etrangers; Hotel de la Poste). From this point the Roja runs in a tolerably direct course to Ventimiglia, where it falls into the Mediterranean; but the traveller who fancies himself near to Nice is disappointed to find that he has still to cross a succession of steep rocky ridges, separating as many short valleys which intervene between the Roja and the Paglione torrent, on which Nice is built. The first of these, the *Col de Brouis*, involves an ascent and descent of about 1,500 feet to reach

Sospello (Hotel Carengo, well recommended, the usual halt for vetturino and posting travellers), surrounded by fig-trees, olives, &c. A still longer and steeper ascent over rocky soil, in summer nearly bare of vegetation, leads by the *Col de Braus* (3,300') to *Scarena*, from whence, by crossing another less troublesome ridge, the road attains the Paglione torrent, often nearly dry in fine weather, and following its left bank reaches

Nice (Inns: Hotel Victoria; Hotel de France—both first-class; Hotel de l'Univers, near the diligences—well-kept, cooler in summer than most of the others; Hotel des Etrangers; Hotel des Princes; Hotel Chauvain; Grande Bretagne; Angleterre; Europe; Paradis; Nord).

ROUTE B.

CUNEO TO THE BATHS OF VALDIERI.

	Eng. m.	Piedm. m.
Village of Valdieri	14	9½
Baths of Valdieri	10	6½
	24	15¾

In 1860 an omnibus went once a day from the Barra di Ferro at Cuneo to the Baths, and carriages (at 20 fr.) were employed by the company who manage the Baths to convey parties from the railway station thither. In that year the carriages and horses were not good; but in this, as in other respects, improvement was expected. The road to the Baths, only completed in 1859, was without barriers in places where it overhangs the torrent; but this source of anxiety to nervous persons has probably been removed.

From Borgo San Dalmazzo (see last route) the road follows the left bank of the Gesso to the village of *Valdieri* (2,493'), the last in the main valley, which here expands into a small plain about a mile wide. On the S. side is the opening of a considerable lateral valley, in which stands, about two miles distant, the village of Entracque (see Rte. D). From this point to the Baths the new road mounts continuously through a narrow glen, where the Gesso brawls its way amidst huge blocks of gneiss and granite. Save a few houses clustered round a saw-mill at the junction of the *Meiris* torrent, scarcely a single house is seen; and the traveller is surprised to find himself thus near to the shores of the Mediterranean, amid scenery as wild as any in the Alps, especially when, as often happens till mid-July, large patches of snow lie unmelted in hollows beside the torrent. No token of civilised life meets the eye till, after two hours' constant ascent, a turn of the glen shows a handsome new bridge, and behind it is a massive stone building with a few ruinous-looking old houses about it, which till lately were the only resort for visitors.

The Baths of Valdieri have enjoyed local celebrity in Piedmont for many

centuries, and were not unknown to the Romans ; but until very lately the difficulty of access and want of accommodation much restricted their use. Their position on the N. side of the Maritime Alps, even more than their height (4,426'), make the climate very cool—too much so, indeed, for the comfort of many invalids. For a mountaineer, however, they afford excellent headquarters.

The whole place is now in the hands of a company represented by a director, and a resident manager. In addition to the old comfortless buildings which previously existed, there are four or five neat wooden houses in the Swiss style, called *châlets*, and a very large stone building, opened for the reception of visitors in 1861. It includes a long dining-room—a room which is lighted up in the evening, and often used for dancing ; a *café* on the ground floor ; and a large number of bed-rooms. The charges are rather high—in the *châlets* 4 fr. a-day for a small room with one bed—and the management is not very efficient ; but, considering the distance from supplies, the *table d'hôte* is well kept. The society is almost exclusively Piedmontese, and, for a watering-place, may fairly be called select. One of the visitors is elected as representative of the rest, to make known any cause of reasonable complaint, and to make arrangements for the general convenience.

There are many mineral springs here, of which three are used. 1. A very hot sulphureous spring, issuing from the rock at about 145° Fahr. 2. A sulphureous spring containing organic matter, called *Acqua di Santa Lucia*, celebrated for its efficacy in ophthalmic complaints ; temp. 95° Fahr. 3. A saline spring, a mild purgative. But the most singular curative agent here arises from the growth of a cryptogamic plant—the *Uva labyrinthiformis* of Allioni—on the surface of the rock over which the thermal waters trickle down to the bed of the Gesso. This forms gelatinous masses, three or four inches

thick, in which, under the microscope, minute insects are seen to thrive at a temperature of 135° Fahr. Large strips of this matter are taken off and applied to the body, being found very useful in some cases of internal disease, for old wounds, &c.

This valley of the Gesso, and that of the Gesso di Entracque (Rte. D), are the favourite resort of King Victor Emmanuel, who is passionately fond of chamois hunting. To suit the king's convenience, paths have been cut in many directions, nearly to the top of the highest peaks. While these are not less convenient to the mountaineer who would explore the neighbourhood, he must be on his guard against the natural conjecture that such paths lead to practicable passes. He will often find them come to an end in some wild spot, from whence there is no other apparent exit. The narrow glen of the Gesso at the Baths lies between two lofty peaks, the *Monte Matto* (10,230') to the NW., and the *Monte della Stella* to the SE. The former may be easily ascended in four hours from the Baths. As, with the sole exception of the Cima dei Gelas, this is the highest point (?) in the chain, the view from the peak must, in fine weather, be both extensive and interesting.

Immediately above the Baths, the glen of the Gesso, entering the proginic granite, divides into two branches : the S. branch leads to the Col delle Cere (Rte. C), while the other, mounting nearly due W. to a small lake, is called *Vallasco*, and is the frequent object of short excursions from the Baths.

This neighbourhood has long been celebrated for the beauty and rarity of its flora, and even the least botanical visitor is attracted by the variety and brilliancy of the flowers which may be found within a short stroll from the Baths. Conspicuous amongst these are *Lychins flos jovis*, *Saponaria ocymoides*, *Potentilla valderia*, *Viola cenisia*, *Paradisica liliastrum*, *Lilium bulbiferum*, *Achillea herba rota*, *Nasturtium pyrenaicum*, and several Alpine species of *Primula*.

The Alpine laburnum, *Cytisus alpinus*, is extremely common, and ascends beyond the limit of other trees to a great height on the mountains, gilding the dark rocks with its profuse masses of bright yellow flowers. In mossy places *Cardamine asarifolia*, and *Tozzia alpina*, are abundant. The Vallasco glen, which is also interesting through its memorials of former glacial action, is particularly rich. On the rocks and slopes upon either side may be found *Arabis allionii*, *Silene cordifolia*, *Saxifraga florulenta*, and *S. pedemontana*, *Cephalaria alpina*, *Pedicularis incarnata*, and other very rare plants. From the upper end of Vallasco are two practicable passes—that to the left leads through the *Vallon di Rio Freddo* to the village of Vinadio, in the valley of the Stura (§ 2); that to the right, called *Col delle Portette*, communicates with the valley of the Tinea (§ 3) through a lateral valley, the *Vallon de Molières*.

There is a tolerably good path, diverging from the road close to the new bridge below the Baths, which leads over the shoulder of the Monte della Stella to the Valle della Rovina, a branch of the Gesso di Entracque. This affords a way of varying the route in returning from the Baths to Cuneo.

When the king is hunting in this neighbourhood, a mountaineer bent on exploring the neighbouring peaks will do well to arrange his excursions so as not to frighten the game from the quarter in which the royal sportsman is engaged.

ROUTE C.

BATHS OF VALDIERI TO NICE—COL DELLE CERESÉ.

	Hours. walking	Eng. m.
San Martino di Lantosca	6	15
Village of Lantosca	3½	10½
Scarena	5	15
Nice	6½	23
	21	63½

through fine scenery, but on the S. side the valley of the Vesubia is hot. From Scarena to Nice, most travellers will prefer to take a vehicle rather than walk, half-broiled, by the dusty high road. The distances above given have no pretension to accuracy.

From the Baths of Valdieri a path in the right bank of the stream leads to the S. branch of the valley, called *Valletta*, and in less than an hour passes a spot where the king often pitches his tent when on a hunting excursion. Near this, on the bank of the torrent, *Senecio balbisianus* grows abundantly, and the bouquets of Alpine flowers which His Majesty sometimes presents to the ladies at the Baths are in great part made up of this extremely rare species. The upper end of the Valletta glen is bare and wild. On the W. side it is bounded by a flat-topped ridge, over which lies a path, practicable for mules, by the *Col di Frema Morta* (8,839'), to the *Vallon de Molières*, a tributary of the valley of the Tinea. This is said to be a dreary and uninteresting pass. At the head of the Valletta valley is a high peak, partly snow-covered, with a depression on each side, either of which might be taken for the pass. That seen to the left, looking up the glen, is said to be impracticable; the right-hand depression is the *Col delle Ceresé*. Crossing the torrent, the track mounts by a steep rocky slope, and among huge fragments of rock, till it attains a wild hollow, enclosed on either side between steep rocks, which mounts for a considerable distance in a direction somewhat east of S. When the writer passed, on July 17, the bottom of this hollow way was filled with snow for its entire length; but before the close of ordinary summers, most of this is melted. On the rocks and steep slopes of débris to the W. are many rare plants; e. g. *Viola nummulariaefolia*, *Saxifraga retusa*, &c. In about 3½ hrs. from the Baths, the summit of the Col (8,412') is attained. The descent on the S. side, far steeper

This is an interesting pass, leading

than the ascent, commences down a ledge against the face of nearly vertical rocks, and soon attains a little tarn lying on a shelf of the mountain. The effect of southern exposure is seen in the abundant vegetation which flourishes at this great height, while at the N. side a few peculiar species can alone manage to exist amidst the almost perpetual snow. The track becomes more and more faint as it descends into a beautiful upland glade, where bright green pastures, rich in flowers of every hue, are here and there broken by rock and pine forest. It seems probable that the true way here makes a considerable sweep to the right, before descending into the main valley, which lies at a great depth below. The writer, in taking a more direct course, found that a pine forest through which he descended came to an end at the brink of a range of precipitous rocks, but on bearing somewhat to the left, he effected a very steep, but not too difficult, descent into the extreme N. branch of the valley of the Vesubia, along which a very tolerable path led in about three miles to the village of *San Martino de Lantosca* (3,209'). The inn, to which he was directed by a French *douanier*, was very forbidding in appearance, but he found no reason to complain of his supper and bed. There is a more attractive hostelry at *Roccabighiera*; but the village inns in this valley seem much on a par in point of accommodation.

S. Martino stands at the junction of the N. branch of the Vesubia with a lateral valley which mounts nearly due E. to the pass of *Le Finestre* (Rte. D). The path down the main valley passes through extremely rich and picturesque scenery: by an early start, the sunshine, here extremely hot in summer, may be avoided for nearly all the way—about 2 hrs.—to *Roccabighiera*, where the path to *Lantosca* crosses from the l. to the rt. bank of the Vesubia. A little lower down, the *Gordalasca* torrent joins the Vesubia from the NE. It leads

up to the *Cima dei Gelas* (10,433'), the highest summit of the Maritime Alps, and by a snow, or glacier (?), pass, the *Passo dei Gelas*, communicates with the valley of the *Gesso di Entracque* (Rte. D). [A much easier pass, the *Col de Raus*, leads from *Roccabighiera* to the valley of the *Roja* (Rte. A)—one track descending through the *Val de Caros* to *Saorgio*; another, along the ridge of the mountain, reaches *S. Dalmazzo*, below *Tenda*.] In descending from *Roccabighiera* to the village of *Lantosca* (about $1\frac{1}{2}$ hour), the change of climate becomes manifest in the more and more southern character of the vegetation. *Cistuses*, *Centaureas*, and other Mediterranean species, make their appearance, and the jujube tree, *Zizyphus vulgaris*, appears perfectly wild on the stony slope of the valley.

Beneath *Lantosca*, where there is a tolerable village inn, the Vesubia has cut a deep channel with vertical walls of calcareous rock, over which the new carriage road, intended to reach *S. Martino*, is carried at a great height above the torrent. A little below the village, on the left bank of the stream, is a lofty wall of rock, along which the old road, a mere horse track, was carried. Here are found *Potentilla saxifraga* and *Saxifraga lantoskana*—plants known only in two or three spots in this neighbourhood—along with *Plagius ageratifolius*, *Genista cinerea*, *Juniperus phœnicea*, and other rarities.

From *Lantosca*, the pedestrian has a choice of three roads to Nice. The easiest is to follow the valley of the Vesubia to *Levenzo*, a village on the l. bank, from whence a low pass leads due S. along the *Rio Secco* torrent to Nice. A second way is to turn out of the V. Vesubia, about 3 miles below *Lantosca*, and ascend through the *Val del Infernet*, to a pass called *Col delle Porte*, E. of the *Rocca Seira* (5,006'). From hence he may keep along the ridge of the mountain above the *Paglione* torrent, descending to the high road, about 12 miles from Nice. The third, and most expeditious, course is

to descend from the Col delle Porte to the high road of the Col di Tenda at Scarena (Rte. A), and there hire a vehicle, or take the diligence, to Nice.

ROUTE D.

CUNEO TO NICE, BY ENTRACQUE AND COL DELLE FINESTRE.

	Hours' walking	Eng. m.
Valdieri 4	14
Col delle Finestre . .	. 6	15
S. Martino di Lantosca .	. 3	8
Nice (Route C) 15	48½
	28	85½

As mentioned in Rte. B, the main valley of the Gesso receives a considerable affluent a little above the village of Valdieri. This is called the *Gesso d'Entracque*, and is formed by the union of the numerous torrents which drain the N. side of the Mont Clapier and the adjoining protogine peaks, the highest in this part of the chain of the Maritime Alps. A char-road runs up the valley for about 3 m. to the village of *Entracque*, where there is a tolerable inn, placed, as the name indicates, at the junction of two streams, where the *Sabbione* torrent is united to the Gesso. A track leading up by the former to the *Col del Sabbione*, communicates with the Valle della Miniera, near Tenda (see Rte. A). Through the main branch of the valley a path, practicable for horses, leads to the Col delle Finestre. About 1 hr. above Entracque, a lateral valley opens to the SW., closed at its upper end by a difficult snow, or glacier, pass—the *Col della Ruina*—leading to the N. branch of the Vesubia, near to the foot of the Col delle Cerese (Rte. C). The main branch, now called *Valle delle Finestre*, mounts due S., passing but one or two huts in the ascent. Another tributary torrent falls in from the SE., descending from the glaciers of the Mont Clapier, over which lies a glacier pass—*Passo dei*

Gelas—leading through the Val Goralasca, a branch of the Vesubia, to Roccabighiera (Rte. C).

The *Col delle Finestre* (8,189') is somewhat frequented by the country people of this district, on account of a sanctuary, called *La Madonna delle Finestre*, which stands about half an hour below the summit, on the S. side of the pass. Near to it is an inn, where a mountaineer will find tolerable quarters, except about the middle of August when it is overcrowded. The spot is interesting to botanists because of the many rare plants which are here found. On some neighbouring rocks, *Saxifraga florulenta*, never seen to flower elsewhere, has been collected. The descent to San Martino di Lantosca is without difficulty, and the way from thence to Nice is described in Route C. [Further information as to the passes between the Col di Tenda and the Col delle Cerese is much desired.]

SECTION 2.

ARGENTIÈRE DISTRICT.

In this section are included the Piedmontese valleys N. and E. of the Maritime Alps, with that portion of the main chain which lies between the Monte Viso and the Mont Enchastraye. The highest point in this range is the *Grand Rioburent* (11,142'). The French engineers have lately ascertained that the *Aiguille de Chambeyron*, lying SW. of the Rioburent, and a little W. of the watershed, is higher by 13 feet. Of the many passes by which the main chain may be traversed, there is but one easy of access, and therefore frequented—the Col d'Argentièr, or Col della Maddalena. The ranges separating the valleys of the Stura, Maira, and Vraita, are of considerable height, but are accessible in most directions by passes of no difficulty. There is no point in this district which can be recommended as

affording to a mountaineer convenient and comfortable head-quarters. There is an inn at Bersesio, in the valley of the Stura (height about 4,500') which is said to be tolerably well-kept, and in the Val Maira Prazzo (3,360'), offers accommodation which would be bearable for a few days; but in the upper part of the Val Vraita there is no halting-place deserving of even this moderate praise.

ROUTE A.

CUNEO TO BARCELONETTE—COL
D'ARGENTIÈRE.

	Hours' walking	Eng. m.
Borgo S. Dalmazzo . . .	2½	8
Demonte	3½	12
Vinadio	2½	8
Bersesio	4	12
L'Arche	3	9
Barcelonette	4½	13½
	20½	62½

There is a good char-road as far as Vinadio, and beyond that a frequented mule-path. The best halting-place is at Bersesio, unless the traveller should prefer to stop at the Baths of Vinadio, an hour's walk away from the direct road.

At San Dalmazzo (§ 1, Rte. A), the road to Vinadio turns to the W. at right angles to the high road leading to Nice, and enters the valley of the Stura, sometimes called, to distinguish it from the river of the same name NW. of Turin, *Stura di Demonte*, passing the hamlet of St. Martino; soon after the Stura appears in its deep course in the valley; and beyond it, rising abruptly amidst some pinnacled rocks and precipices, lies the village of Rocca Sparviera. A little farther on, the road winds down to the river, crosses the Stura, and continues on its left bank almost throughout the valley. The cultivated land which borders the Stura is very rich and luxuriant: the chestnut trees are of great magnitude; and the forms of the adjoining mountains highly picturesque.

About eight Piedmontese (12 English) miles from S. Dalmazzo the road reaches *Demonte* (Inn: 'Fleur de Lys; poor'—[M.]), the principal place in the valley, close to the junction of the Arma torrent with the Stura. From the head of the glen of the Arma a pass called *Col del Mulo* (8,422') leads either to the Val Grana, or to a lateral valley of the Val Maira which joins the main stream opposite to the village of Prazzo (Rte. C).

On a mound in the centre of the valley by Demonte, between the road and the river, are the ruins of a fort, once considered very strong, which guarded this entrance into Piedmont, and which, after undergoing many vicissitudes, was finally destroyed by the French, 1801. The scenery of the valley, rich in fine timber, backed by bold rocky summits, continues to preserve the same character from Demonte to Vinadio (Inn: La Vittoria?), where the char-road comes to an end. A short distance above the village, on the right bank of the river, two converging lateral valleys pour their torrents into the Stura nearly at the same point. Through the easternmost of these—the *Vallon di Rio Freddo*—there is a pass to Vallasco above the Baths of Valdieri, and another, called *Col della Lombarda* (7,858'), leading to the valley of the Tinea. The other lateral valley, *V. di Santa Anna*, affords a more direct communication with the Tinea by the *Col di Sta. Anna* (8,009').

About an hour's walk above Vinadio, at a hamlet called *Pianche*, another ravine opens on the right bank of the Stura, through which, ascending constantly for an hour, is the path to the *Baths of Vinadio*. There is room here for about 100 guests, besides quarters for invalid soldiers; but the accommodation is said to be very inferior to that found at the Baths of Valdieri, and the situation, in a narrow glen, 4,183 feet in height, is cold and comfortless except in the finest weather. There are several picturesque waterfalls in the glen, one of them near to its opening in the valley of the Stura. By a pass called *Colla Lunga* (8,573'), only about 500 feet

below the easily accessible summit of the *Monte della Guercia*, the valley of the Baths communicates with that of the Tinea.

‘Above Vinadio, the change is rapid to wild and Alpine scenery, varying from a road by the stream which ripples through quiet meadows, to narrow paths which overhang the course of the torrent—a course too narrow in the ravine for a path by the river: it is therefore carried on ledges of the precipices above, and forms, in some places, fearful mule-paths for the traveller’s ascent of the valley. Such scenes are observed near Sambuco. Above are the villages of Pied de Port and Pont Bernardo. At a place called the *Barricades*—a narrow defile where defences of the valley were formerly erected, and which was often the scene of desperate conflicts—the road is carried along a shelf of rock above the river, and has been cut out of the precipices which darken and overhang the ravine, and offer an almost impregnable barrier to the passage of the valley. Above the Barricades the road, or rather path, lies amidst the débris of the mountains which bound the valley, and offer a scene of wild desolation.’—[M.]

In this part of the valley the geologist will not fail to observe that the course of the Stura follows pretty closely the line of junction between the gneiss and the metamorphic slates.

From the village of *Pietra Porzio* (3,855') there is a pass to the N., leading to Prazzo in Val Maira by the *Col del Vallonetto* (8,412'). On the opposite side of the Stura three narrow glens open in succession, leading to as many snow-passes over the main chain of the Maritime Alps, whose highest summit in this portion of the range is the *Mont Tinibras* (10,220').

Bersesio, about 4 hrs. above Vinadio, ‘has a very tolerable mountain inn.’—[M.] The head of the valley of the Stura here presents very wild rock scenery. South of the pass which lies in front is the *Mont Enchastraye* (9,747'), and in the opposite direction the *Monte*

della Scaletta (9,508') separates the head waters of the Stura from those of the Maira. From the village of *Argentera* (5,596'), where there is a poor inn, the passes of *Pouriac* (8,360') and *Scaletta* (8,619'), which lie respectively close to the above-named peaks, lead—the first into the head of the valley of the Tinea, the second into the Val Maira by *Acciglio*, its highest village.

Having passed Argentera, the path mounts direct to the Col, before reaching which it skirts a small lake or tarn, *Lago della Maddalena*, the source of the Stura, supposed to be at the same time the source of the Ubayette, which bursts out from the side of the mountain on the French side, a short distance below the summit of the pass.

The *Col de l'Argentière*, called also *Col della Maddalena* (6,545'), the lowest and most accessible passage over the Alps between the Mont Genève and the Col di Tenda, has been the scene of events of some historic interest. In 1513, Francis I. succeeded in conducting his army over this pass from France into the plains of Piedmont, and this was probably the first occasion on which cannon were transported across an Alpine pass inaccessible to wheel-carriages. In 1744, the passage was again effected by a more considerable army, consisting of French and Spanish troops, under the command of the Prince de Condé and Don Philip of Spain.

The view from the summit is rather extensive on the side of France. On the farther side of the valley of the Ubaye, a lofty chain, including the *Grand Berard* (9,997'), comes into view. Many rare plants are found in the immediate neighbourhood of the Col, including *Eryngium alpinum*, *Campanula Allionii*, and *Dracocephalum ruyschianum*. It is an easy descent from the summit to *L'Arche* (5,568'), the frontier village of France, with a poor inn, sometimes visited by botanists. ‘Better accommodation, however, will be found, chez Peneant, at *Meyronne*, where there is a comfortable country inn.’—[M.] From *L'Arche* to *Meyronne* is about an hour’s walk, and

from thence to Barcelonette, $3\frac{1}{2}$ hrs. [Mountaineers who wish for a less easy and unexciting route than the beaten way over the Argentière, may take a track which mounts from the village of Argentera to the *Col de Rioburent* (8,267'), and descends by a somewhat circuitous way to L'Arche. It is used only by chamois hunters and smugglers.] From L'Arche, or Meyronne, the Val Maira (Rte. B) may be reached by the *Col delle Monie*, or the *Col Sautron*; the former is the easier and more frequented of the two passes. 'At Meyronne there is an excellent guide to the neighbouring Alps, named Dumas.'—[M.] A short way farther down the valley is the junction of the *Ubayette* with the more considerable stream of the *Ubaye*. The track, which had previously followed the former valley in a NW. direction, now follows the course of the Ubaye, at first S., and then SW., to

Barcelonette, a small town of 2,200 inhabitants, with a very good inn—Hotel du Nord, chez Maurin. The town is more spacious and better built than might be expected in a position so remote and unfrequented. [The passes from hence to the neighbouring valleys are noticed in § 3.]

Ubaye. *Acceglio* is the best stopping place in the Val Maira above S. Damiano.

Whoever has looked across the plain of Piedmont from an Alpine eminence must have noticed the range of the Monferrat Hills, lying immediately east of Turin, on one of whose outlyers stands the famous church of the Superga. At a not distant period—as geologists reckon time—when the valley of the Po was a gulf from whence the waters were slowly retiring towards the Adriatic, these hills formed a group of low islands; and at a still later period, when the sea had quitted the surrounding plains, they served to separate the streams poured out from each of the main valleys of the surrounding Alps, forcing them into two main channels—one flowing to the S., the other to the N. of the hills. The first of these is that in which the united waters of the Stura, Tanaro, and Bormida, with their numerous affluents, roll towards the Adriatic, beneath the walls of Alexandria. The other and more considerable channel is that of the Po, which, issuing into the plain from its parent valley, receives a number of affluents equal to itself in volume, and, passing Turin, sweeps round the northern base of the Monferrat range, till all these waters are finally united a few miles E. of Valenza.

The Maira and its affluent the Grana, although they enter the plain very near to Cuneo, and for some distance run parallel to the Stura, join their waters to the Po. If the rule which attributes to the longest branch of a great river the distinction of bearing its name were constantly observed, the source of the Po would be sought at the head of the Val Maira, and that valley would not have been so much, and so undeservedly, neglected by geographers and by travellers as it has hitherto been.

From Cuneo to the fine cheerful country town of *Dronero* (Inn: Corona Grossa) the road runs over a tolerably level country, skirting the hills, and crossing the Grana torrent near the opening of Val Grana (Rte. C).

ROUTE B.

CUNEO TO BARCELONETTE, BY VAL MAIRA.

	Hours' walking	Eng. m.
Dronero	3	11
San Damiano	2	7
Stroppio	3	9
Prazzo	$1\frac{1}{2}$	4
Maurin	8 (?)	20 (?)
Barcelonette	7	21
	<hr/> 24 $\frac{1}{2}$	<hr/> 72

There is a good carriage-road from Cuneo to S. Damiano, and a rough mule-path from thence to Prazzo, and to Acceglio; the Col de Maurin is accessible to pedestrians only, but there is a tolerable mule-path from Maurin to Barcelonette, down the valley of the

Those who wish to avoid heat and dust, and to save time, will hire a light vehicle at Cuneo, in which they may accomplish the distance to San Damiano in about $3\frac{1}{2}$ hours, or less in descending from thence to Cuneo.

San Damiano (2,477') has a very tolerable inn; it is finely situated, in the lower open part of V. Maira, surrounded by rich cultivation and fine trees. Above the village the valley contracts, and speedily assumes the character which it maintains for a great part of its length—that of a deep narrow trench cut into sedimentary rocks. The similarity of character between the main valley and many of its tributary glens shows that their actual form is due to the mode of disintegration of the strata through which they pass. The torrent of the Maira in most places runs in a mere cleft at the bottom of the trench, between walls of rock nearly vertical, so that it is scarcely anywhere accessible. The track leading to Stroppo is carried along the steep N. side of the valley, often a mere notch cut into the rock, which is worn into surfaces so slippery as to make it surprising that laden mules can safely pass. Exposed to the full force of the sun in a low narrow valley, the way is oppressively hot in summer, and should be passed either in early morning or towards evening. Above *Alma*, where the valley opens a little, the glen of *Albaretto* on the S. side of the valley, leads over the ridge which separates this from the Val Grana. Approaching *Stroppo* (3,057'), where there is a small inn, the valley becomes still narrower and wilder.

[From hence runs a path to the N., leading over the *Col della Bicocca* (7,611') to Castel Delfino, in Val Vraita. The ravine descending from the pass towards the Val Maira is so steep and precipitous as to be utterly impassable, and the paths from Stroppo and from Prazzo wind respectively over the slopes of the mountains on the E. and W. sides of the ravine, to gain the upper basin which leads to

the Col. The track from Stroppo, after a rather long and steep ascent, passes over a projecting spur of the mountain which commands a very fine view to the S. of the higher peaks of the Maritime Alps, seen beyond the nearer range separating the Maira from the Stura. From hence there is a gentle descent to the village of *Elva*. *Silene vallesia*, and *Saxifraga diapensioides*, with other rare plants, are found hereabouts. The scenery from thence to the pass is very fine, and the peak of the *Pelvo di Elva* (10,056'), rising to the W. so steeply as to leave no space on which snow can lodge, is a noble object. From the summit a still more commanding eminence attracts the eyes of the mountaineer. Nearly due N., at a distance of about nine miles, the Monte Viso rises above all intermediate objects, and displays in successive tiers of rock and ice-slope the summit long deemed utterly inaccessible. This range S. of Castel Delfino (Rte. D), is almost the only quarter from whence it is possible to obtain a good view of the side of the peak by which alone it has been found possible to attack it with success. The ordinary path from the Col descends to the small village of Belino, about 2 m. above Castel Delfino. There is a more direct way to the latter village, not to be found without a guide.]

At *Prazzo*, the next village in Val Maira above Stroppo, there is an inn, said to be tolerably good. On the way between the two villages, on the S. side of the valley, is the opening of the *Valle della Marmora*, whose eastern branch leads to the Col del Mulo (Rte. C), while the W. branch—*Val del Preit*—is terminated by the *Vallonetto* Pass, above Pietra Porzio. (See Rte. A). Among débris above Prazzo is found the extremely rare *Artemisia pedemontana*.

Information as to the passes between the head of the Val Maira and the adjacent valleys of the Stura, the Ubaye, and the Vraita, is utterly wanting. Seen from a distance, there can be no

want of wild and grand rock scenery. The most direct course to Barcelonnette is from the village of *Acceglio*, the last in Val Maira, where there is a very tolerable inn, to L'Arche (Rte. A), by the *Col delle Monie* or the *Col de Sautron*, passes of about equal height. A more interesting, but longer, course is that by the *Col de Maurin* (9,143'), lying in the midst of rugged peaks. The highest summits—the *Aiguille de Chambeyron* (11,155'), to the SW., and the *Pointe Haute de Mary* (10,537'), to the N.—are on the French side of the watershed. The first inhabited place on the W. side is *Maurin*, the last commune in the valley of the Ubaye. At the hamlet of *Maljasset* accommodation for the night may be obtained. Several high and rather difficult passes lead from Maurin in various directions (see § 4); the only easy exit is by the valley of the Ubaye, conducting in about 21 miles to Barcelonnette (Rte. A).

ROUTE C.

CUNEO TO PRAZZO, BY VAL GRANA.

	Hours' walking	Eng. m.
Caraglio . . .	2 $\frac{3}{4}$	10
Castelmagno . . .	4	12
Prazzo (by Col del Mulo)	8 (?)	20(?)
	14 $\frac{3}{4}$	42

The Val Grana is a deep indentation in the range which separates the valleys of the Stura and the Maira, not penetrating, however, so far as the main chain from which that range projects. At the head of the valley, where the ridges which enclose it on either side converge, there is a slight depression, which is easily accessible from the valley of the Stura on the one hand, or from the Valle della Marmora, a tributary of Val Maira, on the other. The Val Grana is said to be exceedingly picturesque, the lower part being open and richly wooded; while above Castelmagno the track is carried for several

miles through a narrow cleft between precipitous rocks whose summits range from 7,000 to 8,000 feet in height.

Caraglio, at the opening of the valley, connected with Cuneo by a good road, is but little above the level of the plain of W. Piedmont. There is a char-road from Caraglio to *Val Grana*, the chief village in the valley, and from thence to *Monterosso* (2,785'). From thence Demonte, in the valley of the Stura, may be reached by the *Col dell' Ortica* (5,928'). From Monterosso the mule-track to the Col del Mulo follows the stream to *Castelmagno*, the last village, and from thence ascends towards the head of the valley. On the right is a foot track over the *Col de Siboulet* to the Val Albaretto, a narrow glen opening upon the Maira, between Alma and Stroppio (Route B). The mule-track bears somewhat to the left, and finally attains the *Col del Mulo* (8,422'), only about 260 feet lower than the adjoining summit of the *Cima dell' Omo*. The course to reach the Val Maira now turns due N., at right angles to that hitherto followed, descending through the *Valle della Marmora*, and joining the Maira a short distance below Prazzo. From the Col del Mulo, Demonte may be reached by following the course of the Arma torrent, and it is said that another track leads nearly due S. to Sambuco.

[Further information as to the Val Grana and the above-named passes is much desired.]

ROUTE D.

SALUZZO TO BARCELONNETTE—VAL VRAITA.

	Hours' walking	Eng. m.
Venasca . . .	4	14
Sampeyre . . .	3	10 $\frac{1}{2}$
Castel Delfino . . .	2	7
Maurin (by Col de l'Autaret) . . .	6	15
Barcelonnette . . .	7	21
	22	67 $\frac{1}{2}$

Saluzzo (Inn: Corona Grossa—very good; 'H. du Coq' [M.]) is easily accessible from all parts of Piedmont by a branch-line from the Turin and Cuneo railway. It stands at the foot of the mountain range which separates the head waters of the Po from those of the Vraita. There is a carriage-road to Sampeyre, in parts very dusty, and a char-road from thence to Castel Delfino. 'Carriage with two horses to Sampeyre, 25 fr.—time, 4½ hrs.'—[W. M.]

To reach the opening of Val Vraita, the road runs S. from Saluzzo to *Verzuolo* along the base of the hills, and a little beyond that village bends to the W. towards the opening of the valley, passing *Piasco*, from whence it follows the left bank of the Vraita to Venasca (1,768'). Beyond this the road begins to ascend, passing the opening of the *Vallone di Girba*, a short tributary glen, through which lies a pass to Paesana, in the valley of the Po—and in the course of the next 10 miles rises about 1,400 feet to *Sampeyre*, the principal village of the valley (Inn: La Croix Blanche, rough, but tolerably good). The Val Vraita presents a marked contrast to the neighbouring Val Maira, being comparatively wide and open, with level ground by the river, well planted with walnuts; and mountains on either side of more gentle inclination, covered with pine forests, here and there giving way to bright green pastures. The char-road is carried along the valley with a continued gradual ascent to *Castel Delfino*, or *Chateau Dauphin* (4,340'). The only inn, a very humble one, is kept by Joseph Antoine Rua, an old blind man, utterly incompetent to provide for the wants of strangers. There is no point in the western Alps where accommodation is more needed than at the head of Val Vraita, especially since it has been shown that the Monte Viso is accessible from this side (see § 4).

Immediately to the W. of Castel Delfino rises a projecting mountain promontory, which is connected by a range of

rugged peaks with the *Grand Rioburent* (11,142'), the highest summit in the main chain S. of Monte Viso. On the N. and S. sides of this lofty group are two Alpine glens, whose torrents, uniting at Castel Delfino, form the Vraita. The more direct route to Barcelonnette lies through the southern branch, called *Val di Bellino*. It contains but the single village of Bellino, about an hour's walk from Castel Delfino. After passing Bellino, the scenery of the valley increases in grandeur. A steep ascent leads to a wild amphitheatre enclosed by precipitous rocks. The track to the *Col de l'Autaret*, which is passable, though not easy, for horses, follows the torrent which descends from the W. to a higher and more contracted basin lying in the midst of rugged peaks, from whence there is no apparent exit. The ascent from hence to the Col is pathless, but easy enough until the last slope of steep débris. The top is a mere ridge. 'I dismounted for the descent, which commenced without any visible path down the loose stones and débris, as on the other side, and was very disagreeable walking. Below the valley opened, and afterwards descended sharply through large masses of rock to the pastures below. We reached the top about 3.30 P.M., and got to Majasset about 6, the last part of the way down being easy walking. We went to the inn mentioned by Murray, found the beds very comfortable, and food good. The charges were high.'—[C. L. W.]

From the head of the Val di Bellino a path turns S. leading to the sources of the Maira, over a pass called (?) *Col de Roi* (8,668'). The passes from Maurin to the valley of the Guil are noticed in § 4.

The northern of the two valleys which meet at Castel Delfino is called *Val di Chianale*, and the chief village, 1½ hours above Castel Delfino, is *Ponte Chianale*. Around this point, as a centre, the main chain connecting the Rioburent with the Viso extends in a lofty semicircle of rugged summits approaching to 10,000 feet in height.

Not less than six passes traverse the chain, all of them high, and but two, the Col de Longet, and Col dell'Agnello, are said to be practicable for mules. For these passes see § 4, Rtes. E and F.

SECTION 3.

BASSES ALPES—VALLEYS OF THE UBAYE, VERDON, TINEA, AND VAR.

To judge from the scanty information to be found in published works, and the equally slight amount which the editor has been able to obtain from other sources, there is no part of the Alpine chain which has been so imperfectly explored as the valleys—all now included in French territory—which lie between the western and southern ramifications of the Maritime Alps. The accommodation to be found in the village inns is certainly poor enough, but not so miserable as in Dauphiné; and except at Barcelonette and Allos there is no place which appears to be well-suited for headquarters. Admitting that the facilities for travelling are not such as to attract ordinary tourists, it is somewhat surprising that amongst the many visitors to Nice some should not be tempted to venture into valleys near at hand, abounding in picturesque scenery, and accessible throughout the greater part of the year. A good deal of valuable information as to the geology of the valleys of the Tinea and Var is to be found in the memoirs of Professor Sismonda, already referred to, unaccompanied, however, by topographical details likely to be of service to a traveller. No reliable information as to distances can be given in regard to the following routes, which are indicated rather than described.

ROUTE A.

NICE TO BARCELONETTE—VALLEY OF THE TINEA.

A rough char-road leads N. from Nice along the right bank of the Paglione to *St. André*. On the way it passes, about 2 miles from Nice, the very ancient monastery of *St. Pons*, founded in 775, destroyed by the Saracens in 890, and rebuilt in the tenth century. The ruined castle of *St. André* is said to command a fine view. Leaving the Paglione, the road continues due N. through the narrow defile of the Rio Secco to *Tourette*, a picturesque village 3 hrs. from Nice, surrounded by limestone mountains of neocomian formation. On the ridge separating this from the next valley of Contes is the deserted village of *Châteauneuf*, which served in the middle ages as a place of refuge to the people of Nice when forced to fly from Turkish corsairs. It has been deserted owing to the want of water, which is very generally complained of amongst these southern spurs of the Maritime Alps.

In about 3 hrs. from *Tourette* the mule-track, crossing a low pass at the head of the *Val di Rio Secco*, reaches *Levenzo*, a village about 1,850 feet in height, overlooking the junction of the *Vesubia* with the *Var*. A steep and rough descent leads to a bridge close to the junction, over which passes the track leading along the left bank of the *Var*, in about 5 m. to the point where the *Tinea* joins that river. Unlike the *Var*, whose general course is serpentine, the *Tinea* flows for many miles in a nearly straight channel a little E. of S. The upper portion of the valley runs parallel to the great mass of metamorphic rocks (gneiss, mica-schist, &c.), which extends from the *Mont Enchastraye* nearly to the *Col di Tenda*. In the southern part of its course between *San Salvatore* and its junction with the *Var*, the *Tinea* traverses a succession of conglomerates, more or less altered limestones, and argillaceous schists, referred by geologists

to the lias, jura limestones, and the inferior members of the cretaceous series. The valley is deeply cut into these strata, and the villages, which occur at rather long intervals, are for the most part perched on the steep slopes of the mountains.

The first village of any importance is *Clanzo* (2,293'), standing above the opening of a lateral valley, through which a torrent descends from the *Mont Tournaire* (6,805'). Next comes the village of *Maira*, and a little beyond it to the NE. is the opening of a lateral valley called *Boulinetta*, leading to *Valdiblor*, where are some rich iron-mines. On the spur of the mountain, lying between the Tinea and the Boulinetta torrent, stands *Rimplas* (3,366'), and a few miles farther up the valley of the Tinea is *San Salvatore* (1,709'), the best halting-place for a pedestrian between Levenzo and San Stefano. Opposite to San Salvatore is a glen, called *Vallone di Mionieira*, leading up to the *Mont Meunier* (9,318'). An active mountaineer would probably find no difficulty in reaching the summit, and descending from thence to Guillaumes in the valley of the Var (Rte. B).

About 12 m. above San Salvatore is *Isola* (2,986'), from whence a path leads over the Col di Frema Morta to the Baths of Valdieri (§ 1), and at an equal distance beyond Isola is the last village in the valley — *San Stefano* (3,848'). While the range to the NW. is altogether composed of gneiss, the mountains on the opposite side of the river show in succession the series of secondary rocks commencing with the lias, in some places, especially towards the head of the valley, overlaid by nummulitic limestone and macigno. In less than 1 hr. above San Stefano, the valley of the Tinea divides into two branches, each of them leading to a pass over the range which divides the county of Nice from Provence. The N. branch of the stream descends from the Mont Enchastraye, and communicates on the one hand with the valley of the Stura by the *Col de Pouriac*, leading to the

village of Argentière (§ 2), and on the other with the Ubaye by the *Col des Granges*. The descent on the French side of the latter pass lies along the *Ver-san* torrent, which falls into the Ubaye about 2 hrs. above Barcelonette. The southern of the two branches of the Tinea traverses a wild dreary glen, called *Val di Sestrières*. After passing the hamlet of *San Dalmazzo il Selvatico*, the mule-track mounts a little N. of W. to the *Col de Planton*. From thence the traveller may either follow the valley of the Bachelard torrent, first to the W. and then due N., reaching the Ubaye about two miles below the town, or he may take a more direct track from the hamlet of *Bellons*, over the *Col de Fours* to

Barcelonette (Hotel du Nord—good). See § 2, Rte. A.

ROUTE B.

NICE TO COLMAR — VALLEY OF THE VAR.

From the junction of the Var and Tinea (see last Route) the first-named stream preserves a nearly straight direction from W. to E. for about 25 miles, flowing parallel to the general strike of the strata through a narrow defile which it has excavated through cretaceous and nummulitic rocks. The principal villages are *Poggetto Teniers*, belonging to the country of Nice, and *Entrevaux* in Provence. From thence there is a char-road by *Annot* and the valley of the *Vaire* torrent, which reaches the Verdon about 12 miles below Colmar. Beyond Entrevaux the valley of the Var makes a rapid bend, mounting to the NE. for fully 12 miles to *Guillaumes* (2,697'), the chief village in the upper part of the valley. From hence are two mountain paths into the upper valley of the Tinea — one by the *Col de Crous* (8,316'), passing the mining village of Peona; the other by the *Col di Bal*, immediately under the peak of the *Cima di Bal* (9,354'), leads more directly to

San Stefano. Above Guillaumes the Var makes another bend to the NW., which leads to the last village, *Entraunes*, enclosed on every side by high and steep mountain ranges. One pass — the *Col de Jallorques* — leads to S. Dalmazzo il Selvatico (see last Route); another due N. reaches the Bachelard torrent near Bellons, and thus communicates with Barcelonette (Rte. A, § 2); while the third, a comparatively frequented mule-track, leads over the range W. of *Entraunes* by the *Col des Champs* to *Colmar*, a small fortified town near the head of the valley of the Verdon.

ROUTE C.

COLMAR TO BARCELONETTE.

About 23 Eng. miles, 8½ hrs. walk.

On the French side of the range which separates the sources of the Var from those of the Verdon is a projecting buttress of mountain, crowned by the *Mont Pela*, whose height has been perhaps exaggerated in the following extract. The district has been scarcely visited by strangers, with the exception of some French botanists who have reaped a rich harvest of rare plants in the neighbourhood of the *Lac d'Allos*.

The little town of *Allos* stands in the valley of the Verdon, about 5 m. above Colmar. 'The accommodations for travellers are poor, but the people very obliging. The neighbourhood is scarcely known to English travellers, but it well deserves their examination, and an excursion should be made to the *Lac d'Allos*, a distance of about 4 hrs. The route to it lies by the village of *Champ Richard*. The lake is one of the largest and most profound in the French Alps, though it is situated at the height of 7,500 English ft. Its form is almost circular, and its circumference is nearly 4 miles. The *Mont Pela*, which rises from the side of the lake, has an elevation of 10,500 ft., more than 3,000 above the lake. There is perhaps no spot in the Alps more

wild and sequestered than the valley of this lake. The surrounding mountains are covered with snow and a few stunted pines, amidst vast precipices and deep ravines. The lake is remarkable for its outlet, which, after a course under ground for 1,500 feet, bursts into the valley, and, after foaming through a succession of cascades, meanders in gentleness and beauty through pasturages rich in vegetation.

'From *Allos* to *Barcelonette* the route lies up the valley of the *Verdon*, and, after passing the village of *La Foax* and crossing a stone bridge, follows the path to the *Col de St. Peire*, which divides the valley of *Verdon* from that of *Barcelonette*. It is a fine pasturage to the summit; and from it a charming view is suddenly presented on looking up the valley of the *Ubaye*. The descent to *Barcelonette* from the *Col* is exceedingly romantic, leading down through a valley of great boldness richly wooded. There is an excellent path down to the valley of the *Ubaye*, but the descent is steep and fatiguing. *Barcelonette* may be reached on foot in 7 hours from *Allos*.'—[M.] There is another track from *Allos* to the valley of the *Ubaye*, which reaches that river about 4 miles above *Le Lauzet*, on the char-road leading from *Barcelonette* to *Embrun*. (See Rte. D.)

ROUTE D.

BARCELONETTE TO EMBRUN — VALLEY OF THE UBAYE.

The *Ubaye* is formed by the union of the numerous torrents that descend between the main range of the Alps S. of *Monte Viso* and another high range extending from that mountain to the SW., which divides the valleys of the *Ubaye* and the *Guil* (§ 4). The former flows through a pastoral valley which, in summer, supports a vast number of sheep that are pastured in winter on the plains of *Provence*, especially that of

La Crau, near Arles. This poor mountain district has been the scene of many encounters between the troops of the Dukes of Savoy and those of France. For two centuries it was held by the former till exchanged for the valleys of Pragelas and Exilles, formerly belonging to France. From its principal source on the W. side of the Rioburent to its junction with the Durance, the Ubaye has a course of about 50 miles. The new char-road which has been for many years in course of construction between Barcelonnette and the Durance is probably now completed, so that the valley is now comparatively easy of access. The various mountain passes leading into the valleys of the Stura, Maira, and Vraita, have been noticed in § 2; those connecting it with the Tinea, the Var, and the Verdon, are referred to in the present section; while the passes into the valley of the Guil find their place in § 4.

Below Barcelonnette the scenery of the valley is of a bare and somewhat dreary character, owing to the rapid disintegration of the oolitic rocks. Passing the village of *St. Pons*, where the ruins of a castle are finely placed, the road traverses the more considerable villages of *Thuiles* and *Méolans*, and reaches the opening of a lateral valley, through which the torrent of *St. Bartélémi* flows from the S. through nummulitic rocks. Through this valley, passing a village of the same name, lies a pass to Allos (Rte C). 5 or 6 miles lower down the Ubaye is *Le Lauzet*, the most picturesque spot in the entire valley. A small lake, said to abound in trout, is surrounded by wooded slopes and patches of cultivated land. Below this point the valley resumes its natural wild and barren aspect all the way to its junction with the Durance.

Below Le Lauzet the Ubaye passes through a narrow defile, and the road reaches the lower level of the valley

by a long series of zigzags skilfully constructed amid steep rocks:—‘Below these tourniquets the valley offers some of its most wild and grand scenes. On looking back from the path carried along the brink of the precipices high above the torrent, the Ubaye is seen in its deep course issuing from the defile of La Tour, and beyond, the grand forms of the mountain of *Cugulion des Trois Evêques*, which divides the valley of Barcelonnette from that of the Var; the scene is one of savage dreariness.’—[M.] If the traveller be bound for Gap he should keep to the road which mounts on the left bank of the stream passing *La Bréole*, until he reaches a bridge about 4 miles below the junction of the Ubaye with the Durance. From thence there is a direct char-road to Gap, passing Remollon.

Should his destination be to Embrun, it is necessary to cross the river by a rapid descent below *St. Vincent* to the village of Ubaye, and thence to ascend due N. over the shoulder of the mountain range which lies in the angle between the Ubaye and the Durance. This pass, called *Col de Pontis*, leads to the village of Pontis, and from thence to the high road from Gap to Embrun, about 7 miles below the latter town, where it crosses to the left bank of the Durance, opposite to the village of *Savines*. Embrun (Inn: Hotel de Milan, fair) is connected with Grenoble by diligence, passing through Gap, or by a rather longer and more interesting route by Briançon and the Col de Lautaret (§ 8).

Pedestrians going from Barcelonnette to Embrun may avoid the hot and not very interesting walk through the lower valley of the Ubaye, by leaving the char-road near to *Revel*, opposite the village of Méolans. From thence two passes of about equal length lead to Embrun—the *Col de Dormillouse* to the NW., and the *Col de l'Eysselette* to the NE. The latter is 8,271 feet in height.

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In the Panorama of the Alps seen from the Superga, or any high ground about Turin, the most conspicuous objects in the western horizon are the peaks of the Roche Melon and the Monte Viso. The first, 11,621 feet in height, stands about WNW. from Turin on the N. side of the opening of the valley of the Dora Riparia; the second still more commanding peak (12,643') lies about due SW. The portion of the main chain of the Alps lying between these limits forms the range of the Cottian Alps. A line drawn through the crest of this range marks a deep indentation

in the general N. and S. direction of the main chain between Mont Blanc and the Mediterranean. Adopting the common simile which likens the Alps to a rampart between France and Italy, the two peaks above spoken of may be considered as the salient angles of two great bastions, whose reentering angle, looking from the side of France, is the peak of the Mont Tabor. From the Roche Melon to the Tabor the direction is but little S. of W., while from thence to the Viso the chain runs about due SE. The direction of the valleys on both sides of the chain is very

irregular, evidencing the action of complicated causes in the elevation of the mass; but the predominant forces, especially on the French side, seem to have operated along the line from NW. to SE. On the W. side, the Cottian chain is separated from the Alps of Dauphiné by the valley of the Durance. The two principal sources of that river lie in the range immediately W. of the peak of the Mont Tabor (10,436'), which is separated from the Dauphiné Alps by the Col de Galibier, the pass which, on geological as well as orographic grounds, has been fixed upon as the limit of the Cottian Alps in this direction. It is not so easy to fix with precision the NE. limit of this range. Some geographers have selected the imaginary peak of the Mont Iséran; but besides the objection derived from the non-existence of that mountain, it seems natural to regard the point in the main chain where it alters its direction from W. and E. to N. and S. as the limit between the Graian and Cottian Alps. This is, therefore, placed at the twin peaks of the Roche Michel and Roche Melon, overhanging the pass of the Mont Cenis.

SECTION 4.

VISO DISTRICT—VALLEYS OF THE PO AND GUIL.

THE want of comfortable accommodation at any point convenient for mountain excursions has hitherto withheld most travellers from exploring the neighbourhood of Monte Viso, but the successful ascent of that remarkable peak in the summer of 1861, and the opening of a tolerable mountain inn at Crissolo in the valley of the Po, may help to direct new visitors to this dis-

trict. The peak of Monte Viso is composed of chloritic slates, but on its eastern side serpentine appears at a great elevation, much varied in structure and appearance, and sometimes passing into euphotide, the whole having been forced through the overlying gneiss and mica-schist, which are probably altered palæozoic rocks. Secondary rocks of sedimentary origin, but so altered as to be scarcely distinguishable as such, have been raised to a great height on the N. side of the mountain, especially at the head of the valley of the Po. The Monte Viso has been above compared to the salient angle of a bastion projecting from the French frontier towards the plain of Piedmont; this angle is so extremely sharp, that if a circle be drawn round the mountain, more than seven-eighths of the circumference will lie on the side of Piedmont, while less than one-eighth will be included in the narrow valley which receives the head-waters of the Guil. The eastern face fronts the valley of the Po; but the peak itself, which rises on the Italian side of the watershed, as well as the southern slope of the high range which extends for about 8 m. to the westward, pour their waters into the Vraita through the Val di Vallanta and the Val di Chianale. A considerable range extends to the E. between the valleys of the Po and Vraita, and subsides into the plain of Piedmont at the city of Saluzzo. Another and loftier range on the W. side of the main chain separates the waters of the Guil from those of the Ubaye. Several points in this latter range rise to between 10,000 feet and 11,000 feet, but the alleged existence of a peak measuring 3,995 metres, or 13,107 English feet (*Pointe des Orches*, given on the authority of Baron Zach), is utterly unfounded in fact, the height of that peak being not more than 10,673 feet.

ROUTE A.

SALUZZO TO MONT DAUPHIN—COL DE
LA TRAVERSESETTE.

	Hours' walking	Eng. miles
Paesana	4	14
Crissolo	2½	8
Col de la Traversette	3	7½
Abriès	5	13
Queyras	2½	8
Mont Dauphin . .	4½	15
	21½	65½

Saluzzo (Inns: *Corona Grossa*, good, *H. du Coq*) is reached in $1\frac{3}{4}$ hrs. by railway from *Turin*. The town stands at the NE. base of the mountain range which separates the valley of the *Po* from that of the *Vraita*, and to enter either of those valleys it is necessary to wind for several miles round the foot of the hills along a hot and dusty road, so that it is advisable to hire a carriage (charge 20 fr. with two horses, changing at *Sanfront*) or else take the omnibus which plies (in the afternoon?) to *Paesana*. By the latter conveyance the traveller would probably lose the beautiful views of the *Viso* which constantly recur along the road. About half-way to *Paesana*, at *Martiniana*, the road fairly enters the valley wherein the *Po* has its source. About $2\frac{1}{2}$ m. farther is the small town of *Sanfront*, and nearly 5 m. beyond, in the midst of rich scenery, is

Paesana (*Albergo della Rosa Rossa*; *Alb. del Gallo*, fair), the chief town in the valley, 1,778 feet above the sea. From hence there is a picturesque road, through wooded hills, to *La Torre di Luserna* (§ 5), passing *Barge* (Inn: *Lion d'Or*, good and cheap). Above *Paesana* the scenery of the main valley is very fine, and the peak of the *Viso* becomes a more and more imposing object whenever it comes into view. Nearly half-way to *Crissolo* is the junction of the *Lenta*, which rises from several small lakes at the SE. side of the peak of *Monte Viso*. On the spur of the mountain, in the angle between the *Lenta* and the *Po*, is *Oncino*, finely situated, and commanding a noble view; the inn appears poor.

Several passes lead from thence to the *Val Vraita*.

The mule-track to *Crissolo* keeps to the right, along the left bank of the valley, which, above the junction of the *Lenta*, changes its character. The chestnut trees which have hitherto shaded the path disappear as it enters a wild gorge, and then emerges upon green meadows, bordered by willows and alders. Above the hamlet of *Ostana* the *Po* is joined by a stream, which has run for some distance nearly parallel to it, being separated by a mass of rock, on which stands the church of *San Chiaffreddo*. This is a sanctuary whereat a *festa* is held in the month of September. Part of the massive white building adjoining the church is used as an inn (*Albergo della Cernaja*) to accommodate the numerous visitors who gather at that period. At other times a traveller will fare rather better there than at the inn at *Crissolo*. The church, which commands a beautiful view, is most easily reached by a path which mounts in 10 minutes from the lowest hamlet of *Crissolo*. This is the highest village in the valley of the *Po* (4,544'), and consists of three hamlets, at the lowest of which a small inn was opened in 1860. Though poor enough, the accommodation here, or at *San Chiaffreddo*, is better than at any other place near to *Monte Viso*.

Crissolo is an excellent station for the botanist, many rare species being found in the immediate neighbourhood, especially on the slopes of the mountain N. of the village. Amongst others, *Campanula elatines*, *Vicia onobrychoides*, *Saxifraga diapensioides*, and *Sedum al-sinefolium*, may be mentioned.

In the jurassic rocks (?) all of them more or less altered by metamorphic action, are some extensive masses of dolomite inter-stratified with comparatively pure limestone. In one of these layers of dolomite is the celebrated cave called *La Balma di Rio Martino*. The entrance is on the face of the mountain, opposite to *Crissolo*, and about 1 mile farther up the valley. A

narrow passage leads to a first spacious hall, beyond which a second, and then a third, are reached by connecting galleries. The whole is lined with stalactites, which can be seen to perfection only by brilliant illumination. Those who would enjoy the effect should bring Bengal lights, easily procured in Turin. Various marvellous stories as to the origin and history of the cavern are current among the natives. It is needless to say that it is merely a specimen of a class of phenomena common in most limestone districts. Above Orissolo are several clusters of wretched stone huts, the lowest and most considerable of which is called Giarumba. The valley now becomes thoroughly Alpine in character: huge blocks fallen from the mountains on either side, or borne down by the glacier which once filled the entire valley, are strewn in wild confusion, but in the midst is a small grassy plain, called the *Piano di Fiorenza*—the filled-up bed of an ancient lake—which in summer produces a rich variety of rare Alpine plants. *Cardamine thalictroides* may be found amongst the débris and the crevices of rocks in the ascent to the next and highest plateau in the valley—the *Piano del Re*. This is an irregular plain, above whose bare dark rocks, interspersed with patches of verdure, the eastern face of Monte Viso rises very grandly, not presenting the appearance of a continuous wall of rock, but rather to be likened to a range of shattered towers and pinnacles, with many intervening gaps and chasms, increasing gradually in height from the N. end, over which lies the pass of the Traversette, to the highest peak, which forms the S. extremity of the range visible from this point.

[From hence a pass, bearing on the Government map the singular name of *Col del Color del Porco* (9,604'), and called by the natives *Col del Porco*, leads direct to the extreme head of the valley of the Guil. To the left of the Piano del Re the largest of the torrents that form the Po is seen falling over steep

rocks. A somewhat arduous ascent by a rough path leads on that side to the group of small dark lakes that are held to be the proper sources of the Po. From thence a ravine rising rapidly to the SW. cuts off the highest peak of Monte Viso from the main mass of the mountain, thus throwing it altogether on the Italian side of the watershed. More nearly due W. of the highest lake is a steep bank of grass-grown fragments of rock, looking like an ancient moraine. Above and somewhat to the rt. of this is a couloir or narrow ravine leading up to the notch in the ridge, which forms the actual Col. On the French side, the descent is by a wider and longer ravine, the right side of which appears the most practicable. It is possible to reach the Col de Vallante by bearing to the left when on a level with that Col, crossing rocky slopes and snow beds. 'It is doubtful whether we saved time by this, and whether it would not have been better to descend lower and remount to the Vallante.' Time from Piano del Re to Col del Porco, 2 hrs.—from Col del Porco to Col di Vallanta, 1 $\frac{3}{4}$ hr.—[W.M.]

The way to the Col de la Traversette lies away from the lakes to the right, or N. from the Piano del Re; it is at first not steep, but after entering a hollow, where snow lies for the greater part of the year, the real ascent begins. This hollow forms the extreme NW. angle of the valley of the Po, and is closed at the N. side by the Monte Meidassa (10,991'), which separates it from the head-waters of the Pellice. The shortest way to the Col now mounts nearly due W. over steep slopes of débris or snow, according to the season, till the upper and steeper part of the ascent is reached, where it is necessary to keep to the track, which mounts with tolerable rapidity, but without the slightest real difficulty, to the summit. About 300 feet below the crest of the ridge is the remarkable tunnel cut through the mountain in 1480, by Ludovico II., Marquis of Saluzzo, to facilitate intercourse between his territory and the

adjoining valleys of Dauphiné. It was not only the earliest work of the kind, but still remains one of the most remarkable, the height of the tunnel above the sea exceeding 9,500 feet. It has been repeatedly closed by the falling of rocks, but after a long period of disuse was cleared out a few years ago. The opening is, however, obstructed by snow throughout the greater part of the year, which remains, in some cold seasons, such as 1860, until the month of July. The actual crest of the ridge, or *Col de la Traversette*, is about 10,000 feet in height, according to Professor Forbes, $3\frac{1}{2}$ hrs. from Crissolo ascending, and about $2\frac{1}{2}$ descending. To those who approach from the side of France, the view suddenly unfolded at the summit, extending, in clear weather, across the entire plain of Piedmont as far as Milan, is extremely striking. The near view is, however, more imposing from a point lower down; where, on turning the angle of a rock, the adjoining mass of Monte Viso, not seen from the actual summit, comes out very grandly.

The descent on the French side is not nearly so steep as that towards Piedmont. In parts the ancient paved track is visible, but in most places it has been destroyed, or covered over by débris. Half an hour in the descent—1 hour ascending—separates the barren ridge of the pass from Alpine pastures of extreme beauty, which in the early summer are covered with rare and exquisite flowers. Here stood a *bergerie* of larger dimensions than usual, but it was crushed by the heavy snows of the spring of 1860, and does not appear to have been since rebuilt. From hence there is a pass into the valley of the Pellice, by the *Col de Seylières*, accessible in $\frac{3}{4}$ hr. from the old *bergerie*. Lower down in the valley, on the left bank of the Guil, are the chalets of *La Ruine*, where a traveller wishing to explore this side of Monte Viso may obtain very tolerable night-quarters.

The descent from the Col into the valley of the Guil is effected by a short lateral valley, or hollow, from whence

there is no view of the peak of Monte Viso, and by following the regular track that view is not obtained until you are already some miles away from the base of the peak. Those who do not object to less than 1 hour's extra march over rough ground, will be well rewarded if they will quit the regular track at the point where it first enters upon the Alpine pastures, and bear away to the left towards the head of the valley of the Guil, at the actual base of Monte Viso. An extremely striking and grand scene is here presented. The head of the valley, once the bed of a glacier, is an irregular nearly level plain, carpeted by Alpine plants that vegetate during the very short season in which the ground is clear of snow. It is obvious that a slight change of climate, whereby the summer heat, now barely sufficient for the purpose, should fail to melt the entire mass of snow that accumulates every winter, would in a few centuries restore the past condition of the valley. At the extreme head of the valley rise, one above the other, the huge shattered masses of rock that make up the peak of the Viso. Neither on this nor on any other side is there space for any considerable accumulation of snow; and on that account, more even than because of the milder climate of the adjoining valleys, this mountain, unlike every other in the Alps at all comparable to it in height, bears no glaciers on its flanks, unless some small patches of frozen snow lying upon the upper ledges may deserve that name. To the right of the peak lies the snowy ridge over which the pass of Vallante leads into the Val Vraita (Route B), and on the left is the very steep and rugged range connecting the summit with the Col del Porco and Col de la Traversette.

There is a tolerable horse-track down the valley of the Guil to the highest hamlet, La Chalpe, and from thence to *La Monta*. About half-way a slight bend in the valley cuts off the view of Monte Viso, and the scenery from thence to Queyras is rather tame and uninteresting. At La Monta, where

there is a very poor and dirty inn, the path from the Col de la Croix (§ 5) joins the present route, and from hence to the junction of the Guil with the Durance there is a tolerable char-road. From La Monta it is nearly 4 m. to *Abriés*, the highest village in the valley of the Guil; the inn (*Etoile*) may be called fair for Dauphiné, but is neither clean nor quiet. As in most of the country inns in this part of France, extortion will be attempted whenever it is thought likely to succeed, and it is prudent to fix prices beforehand if you would avoid disputes. It should be understood that this place is 5 hours' walk from the foot of Monte Viso, and that no view of that or any other high mountain is to be obtained near to the village; so that, although convenient as a halting place, this is by no means an attractive spot as head-quarters.

The road from *Abriés* to *Guilestre* passes opposite to *Ville Vieille* (Inn: l'Éléphant, apparently one of the best in the valley), 2 hrs. below *Abriés*, at the junction of the *Val de Molines*, through which lies the track to *St. Veran* (Rte. C). A short distance farther down the main valley is the *Chateau de Queyras*, picturesquely placed on a rock commanding the entire valley above and below. It contains a small garrison. There are two small inns here, both said to be tolerably good. On the right side of the Guil, below *Queyras*, is the opening of the lateral valley of *Arvieux*, through which lies a mountain route to *Briançon* (§ 6). Between *Queyras* and *Guilestre* the road passes through varied and singular scenery, very unlike in character that of most other Alpine districts. The summers being extremely hot, the scanty vegetation which alone exists on these barren mountains is soon burnt up, and after midsummer little remains beside some fragrant shrubby species, such as the wild lavender, the hyssop, *Satureja montana*, &c. The botanist, however, finds an abundant and rich harvest in this district, especially in the months of June and July. At *La Maison du Roi*, 1 hr.

above *Guilestre*, the road ascends the slope on the l. bank of the Guil, crossing the shoulder of the mountain dividing that torrent from the *Rioubel*. Here the *Mont Pelvoux* is seen to great advantage, towering over the head of the *Val Louise*, and overtopping all the intermediate ridges. The reddish hue which prevails among the rocks that enclose the valley of the Durance, and their extreme barrenness, will remind the traveller of the colouring and character of scenes in Palestine, while the extensive records of ancient glacier action bring very opposite impressions to the fancy of the geologist. At some distance from the Guil, on the *Rioubel* torrent, is the village of *Guilestre*, where there is a large inn (*Hotel des Alpes*), with tolerable accommodation, but neither clean nor reasonable. About 2 m. from hence the road enters the valley of the Durance, and joins the high-road from *Embrun* to *Briançon* immediately below the small fortified town of *Mont Dauphin*. Good accommodation, clean beds, and moderate charges, are found at the *Café du Nord*, chez *Joseph Chimat*. This is perhaps the best stopping-place to be found in Dauphiné — no high praise, however, as the district is wretchedly provided in this respect. This strong fortress is placed upon a rock nearly insulated at the confluence of the Guil with the Durance. It commands a fine view over the singular scenery of the surrounding mountains, and from some points the *Mont Pelvoux* is seen in the background. The diligence between *Embrun* and *Briançon* stops to change horses at the *Plan de Phazy*, near the foot of the hill, but there is a rather steep ascent of fully 20 minutes to reach the inn. *Mont Dauphin* is 11 m. from *Embrun* and 21 m. from *Briançon*. A so-called courier travels in a four-wheeled mail-cart between *Guilestre* and *Abriés*, but the hours of starting, both in going and returning, are inconvenient to travellers. Horses and vehicles are dear in this district, especially at *Abriés*. A char from *Guil-*

estre to Abriés cost 20 francs in 1861. In the same year, at Abriés, a horse for a lady, without side-saddle, was charged 15 frs. a-day; and for a mule from thence to Briançon, over the Col d'Izouard, 40 frs. The charge for horses is said to be still higher 'between the 1st and 21st of July, that being the time allowed by the French Government for cutting wood in the forests.'—[M.]

ROUTE B.

ASCENT OF MONTE VISO—TOUR OF MONTE VISO.

The Monte Viso had long enjoyed a reputation for inaccessibility, second only to that of the Matterhorn, and due rather to the formidable appearance of the crags that rise tier over tier to its summit, than to the actual experience of any competent mountaineer who had attempted the ascent. This was for the first time effected in 1861 by Mr. W. Mathews and Mr. F. W. Jacomb, both members of the Alpine Club, accompanied by Jean Baptiste Croz and Michel Croz of Chamouni. The southern face of the peak is the only side by which it appears practicable to reach a considerable height without encountering serious preliminary difficulties, and accordingly it was from that side that the attempt was made. It has been already remarked that the northern branch of the Val Vraita, called Val di Chianale, receives the drainage of the S. side of the Monte Viso, and of the high range, which, extending W. from that peak, is prolonged on the side of France into the mountain ridge separating the valleys of the Ubaye and the Guil. About 1 hr. above Castel Delfino (§ 2), at the hamlet of *Ponte Castello*, is the opening of the *Val di Vallanta*, a lateral glen descending due S. from Monte Viso. One hour above the junction are some châteaux, called *Pian Meyer* in the Government map, where the traveller will find milk, cheese, and hay to sleep upon. Close to these

châteaux the valley forks: one branch mounts to the Col de Vallante, on the W. side of Monte Viso; while the other, called *Val Forcellina*, leads directly to the base of the highest peak. The scenery of the Val di Vallanta is throughout very fine. In the lower part, near the above-named châteaux, are many rare plants; e.g. *Campanula Allionii*, *Senecio Balbisianus*, *Euphrasia lunceolata*; while higher up are *Primula marginata*, *Ranunculus pyrenæus*, and many others.

On Aug. 29, 1861, Messrs. Mathews and Jacomb, with their guides, commenced the ascent from the Val Forcellina by the terminal buttress of the ridge separating that valley from the upper Val di Vallanta. The lower slope is covered with arollas (*Pinus cembra*), rarely seen in this part of the Alpine chain, and above these by broken rocks. This forms the base of a detached peak called the *Petit Viso*, and to reach the main mass of the mountain it is necessary to bear to the NE. past the base of the peak of the Petit Viso. The travellers now found themselves in a ravine, or broad *couloir*, running up to the left, and apparently leading near to the summit of the mountain. Having climbed to the head of the ravine, which was reached in about 5 hours from the châteaux, they found themselves on the main (E. and W.) ridge of the mountain, upon one of the minor summits in the serrated range between the Petit Viso and the highest peak, and separated from the latter by a deep gorge. Upon this exposed summit, (11,249'), commanding a view, on the one hand, over the Dauphiné Alps, and on the other far over the plain of Piedmont, the party passed the night.

'On the following day (August 30), as soon as it was light enough to start, which was at 4.30 A.M., we left our camping place, descended into the gorge, and mounted a snow-slope on the opposite side of it. Thence we bore to the left, nearly along the line of the reentering angle, in which the ridges dividing the Val Forcellina from the Val Vallante and the Val di Po inter-

sect each other, climbing up a succession of very steep couloirs and faces of rock, covered with fragments so insecurely poised that the slightest touch dislodged them.

'The summit not being visible during the ascent, we kept as near as practicable to the edge of the precipices overhanging the valley of the Po, which, like other portions of the mountain, are rent by numerous fissures. At length Michel Croz, who was in advance, suddenly stopped, and on our shouting to ask him if he had reached the top, he replied, that he thought he had, but that there was another farther on. On joining him at 9.20 A.M., we found ourselves upon a rock-strewn ridge, while parallel to it, at a little distance, there was a similar one, connected with the first by a curving *arête* of snow, interrupted here and there by rocks. As it was impossible to say which was the higher, we built cairns upon each of them.'—[W. M.]

The view included the entire range of the western Alps from Provence to Monte Rosa, but the great plain of Piedmont was concealed by haze, and a low bank of cloud lay along the ridge of the Maritime Alps, leaving it still an open question whether the Mediterranean be visible from the summit. Owing to the considerable height of the range S. of the valley of the Stura, it is, however, probable that no point of the coast can at any time be visible, though a glimpse of the sea should be sometimes gained.

In the succeeding season, 1862, Mr. F. F. Tuckett made the second ascent, and passed an entire night upon the summit. Having been hospitably received at a chalet rather above those of Pian Meyer, Mr. Tuckett ascended the Val Forcellina to some small lakes near the E. base of the Col delle Sagnette, 2 hrs. from the chalet. An ascent of $2\frac{1}{2}$ hrs., partly over rock, and partly on steep snow slopes, sufficed to reach the ridge at the base of the highest peak, and $1\frac{1}{2}$ hr. more by the same ridge previously climbed by Mr. Mathews took

them to the top. $3\frac{3}{4}$ hrs., exclusive of halts, sufficed for the descent. The outline of a mountain seen in the farthest distance, somewhat E. of S., must apparently have belonged to the Island of Corsica.

Taking a mean between the measurements by the Piedmontese engineers, a barometric measure by Mr. Mathews, and four barometer observations taken by Mr. Tuckett, the height of Monte Viso is 12,643 feet.

Mountaineers desiring to ascend Monte Viso should take a supply of provisions from Saluzzo and proceed in a carriage to Sampeyre. From thence the baggage should be conveyed by mule or porters as far up as possible in the Val Forcellina, in order to pass the night in the gorge near the base of the highest peak. Covering might be taken from Sampeyre or Castel Delfino, and firewood from the Arolla forest.

The SE. buttress of Monte Viso is connected with the mountain range separating the valley of the Po from that of the Vraita, and is probably accessible at many points. The pass nearest to the Viso is the *Passo delle Sagnette*. This was the route taken by Messrs. Mathews and Jacomb, who, after achieving the ascent, desired to pass into the valley of the Po. 3 hrs. sufficed for the descent from the summit to the E. foot of the Col, and 20 min. more to gain the ridge. This overlooks a small lake, the chief source of the Lenta, a tributary of the Po, which joins that stream below Oncino (Rte. A). The descent lies over extremely steep slopes of fine débris, down which it is easy to slide in $\frac{1}{2}$ hr., but which must be very troublesome in the ascent. The lake occupies one end of an irregular plateau strewn with huge blocks, leading to the lakes above the Piano del Re at the head of the valley of the Po. They do not appear to be separated by any ridge of solid rock, but merely by hillocks formed by the remains of ancient moraines, left on the ground during the retirement of the great glacier which once filled the entire

space, and poured down separate ice-streams towards the plain of Piedmont through the valleys now drained by the Po and the Lenta. From the lake above-mentioned Crissolo may be reached in about $2\frac{1}{2}$ hrs., but Messrs. Mathews and Jacobb preferred to follow the Lenta to Paesana. After passing the châteaux of Alpetto, a path passes above a gorge where the river flows between walls of serpentine, which show well-marked traces of glacier action. In 3 hrs., fast walking, they reached Oncino, and in 2 hrs. farther Paesana (Rte. A).

The Monte Viso is probably the only peak, of nearly equal height, of which the complete tour can be made in a single, though laborious, day's walk. But three ridges diverge from the mountain—that on the N. side continuing the range of the Cottian Alps—the minor range separating the waters of the Vraita from those of the Po and the Lenta—and lastly, the main chain connecting the Viso with the Maritime Alps, which encloses the head of the branch of Val Vraita, called Val di Chianale. Immediately W. of the Viso is the *Col de Vallante*—the pass naturally selected for making the tour of the mountain, at the head of the *Val di Vallanta*, the main branch of the valley leading from Castel Delfino to the Monte Viso.

If it be desired to complete the tour in one day, it should be undertaken from the highest châteaux in the valley of the Guil rather than from Crissolo; for though the accommodation at that place is better, the addition of about eight miles, and fully 2,000 feet of ascent, to so long a day's walk, is not to be recommended. To enjoy the scenery at the best advantage, it would be advisable to commence the expedition by the *Col de la Traversette* (Rte. A), so as to be on the summit of the pass at, or soon after, sunrise. At the base of the descent, instead of following the track towards Crissolo, you should keep along the slope above the *Piano del Re*, near to the lakes, the sources

of the Po, and over the rough ground which intervenes between them and the lake at the foot of the *Passo delle Sagnette*. By keeping as much as possible to some steep slopes of turf and rock, the difficult and laborious ascent of the latter Col through soft yielding débris may be partly avoided. On reaching the summit you have the main mass of Monte Viso, extending from the highest peak to the Petit Viso, immediately on the right hand, while in front is a deep gorge forming the head of the Val Forcellina, which joins the Val di Vallanta, as already mentioned, near to the châteaux of Pian Meyer; and those who have hitherto made the tour have descended to the junction, and from thence reascended to the Col de Vallante. As this involves considerable labour and delay, it is desirable to ascertain whether a practicable course may not be found along the S. side of the peak of Monte Viso and round the Petit Viso, by which the passage from one col to the other might be considerably shortened. The attempt should be made only by practised cragsmen, and not too late in the day. The ascent from Pian Meyer to the Col de Vallante lies through a rocky valley on the W. or right bank of the stream. As this becomes narrowed to a mere gorge, the path disappears, and the last part of the ascent lies up a steep couloir partly filled with snow, which terminates abruptly on the snow-covered ridge forming the summit of the pass, about 9,350 feet in height, and $2\frac{1}{2}$ hrs. from Pian Meyer. In descending towards the head of the valley of the Guil, it is best to keep along the ridge for a short distance in the direction of Monte Viso, and then bear away to the left. The snow-field slopes at first gently, then more steeply, and the final descent is over débris to the left of a ridge of steep rocks. In clear weather, practised mountaineers do not require a local guide, but when clouds lie on the pass, it is not easy to find the way, and it would be unwise to attempt it without the help of one of the shepherds, who

are generally to be found at the highest pasturages on either side.

The head of the valley of the Guil has been described in Rte. A. From the point at which the nearly level bottom of the valley is reached, the highest chalets are distant little more than $\frac{1}{2}$ hour. They stand on the N. side of the stream, and might easily be overlooked among the scattered blocks which have been left by the glacier that once filled the valley.

The first traveller to make the tour of Monte Viso was probably Professor J. D. Forbes, who visited this district in 1839. He found it to be a very laborious day's work of 14 hrs; but it would appear that he crossed a col more distant from the summit than the Passo delle Sagnette, thereby lengthening the route. The way above pointed out would probably require 12 hours' fair walking, exclusive of halts. In attempting to make the circuit from Crissolo, it would be advisable to begin with the Col de la Traversette, starting before daylight. In this way the troublesome ascent to the Col delle Sagnette would be avoided, and the distance might be accomplished in 14 hrs., exclusive of stoppages. The excursion is one of the highest interest, including more varied scenery than is often to be found in a single day's walk.

ROUTE C.

BARCELONETTE TO GUILRESTRE — COL DE VARS.

This is the easiest and most direct route for a pedestrian wishing to reach Briançon or the Mont Pelvoux district from Barcelonette; it does not appear, however, to be particularly interesting.

From Barcelonette the mule-track mounts the valley of the Ubaye to the junction of the Ubayette (§ 2, Rte. A), and then, instead of turning E. to Meyronne, follows the main valley to

the village of *St. Paul*, 4 hrs. from the town. From thence there is a rather rapid ascent almost continuous to the summit of the *Col de Vars* (6,932'). On the N. side a long and gradual descent, following the course of the *Chagne* torrent, leads to Guilestre (Route A) in 5 hrs. from St. Paul or about 9 hrs. from Barcelonette.

ROUTE D.

BARCELONETTE TO QUEYRAS, BY ST. VERAN.

7 hours to Maljasset, $8\frac{3}{4}$ hours from thence to Queyras.

This is the most interesting, in point of scenery, of the passes between the valley of the Ubaye and the Guil, but is longer and more laborious than the others. The only place on the way where tolerable night-quarters are to be found is at Maljasset, near the head of the Ubaye valley.

At *St. Paul*, noticed in the last route, 4 hrs. from Barcelonette, the track leading to St. Veran keeping to the W. bank of the Ubaye mounts through a defile; and after passing a few scattered houses reaches, in about 3 hrs., *Maurin*, the highest commune in the valley, more than 6,000 feet above the sea. It consists of three hamlets, at one of which, *Maljasset*, there is, or was, a little inn, kept by Cressy, who acted as guide to the neighbouring passes. [At this point a number of mountain tracks converge. Those on the E. side—the Col de Maurin leading to Val Maira, and the Col de l'Autaret to Val Vraita—have been noticed in § 2 (Rtes. B and D). In the opposite direction is a pass leading in 7 hrs. to the valley of the Guil, by the *Col Tronchet* (8,747'). The track descends to Ceillac through the valley of the *Melezet*, joining the Guil about 3 m. above Guilestre.]

The track to St. Veran, keeping to the NE., continues to follow the stream of the Ubaye, and after passing a small

lake, produced by a great landslip, on the banks of which rye is grown at nearly 7,000 feet above the sea, mounts steeply along the l. bank of the torrent, through a wild glen immediately to the W. of the *Rioburent* (11,142'), which is accessible from this side. At the head of this wild valley, the traveller may choose between four passes, two of which are described in the next Route. The most westerly of these—the Col de Cristillan—is the way to Guilestre; while the Col de Longet, in the opposite direction, passes by the N. side of the Rioburent to Ponte Chianale, and thence to Castel Delfino. Between these are two passes, both leading to St. Veran. Of the *Col de l'Agnel*, which lies nearest to the Rioburent, the editor has no information. The other pass is sometimes called the Western Col de Longet, but more commonly *Col de la Cula* (10,076'); it is reached without difficulty in 4 hrs. from Maljasset. The view of the Dauphiné Alps on one side, and Monte Viso on the other, is said to be of the grandest character. Much snow lies near the summit, especially on the N. side. A rapid descent leads in 2½ hrs. from the Col to *St. Veran*—a considerable village, probably the highest in Europe, being 6,591 feet above the sea. Barley and rye are here cultivated up to a height of 7,000 feet. There is no inn; but a stranger may probably obtain accommodation at the house of the curé. As in many of the Alpine valleys of Dauphiné, the population, in great part Protestant, presents an appearance of misery and filth, which painfully contrasts with the cleanly and comparatively comfortable aspect of their neighbours in the Waldensian valleys of Piedmont. About $\frac{3}{4}$ hr. below St. Veran is the village of *Molines*, where the track from Ponte Chianale by the Col de l'Agnello (not to be confounded with the Col de l'Agnel above-mentioned) joins that from St. Veran. Below Molines is a good road, which leads in 1 hr. to *Ville Vieille*, where there is an inn

(*L'Eléphant*), which is probably the best in the valley of the Guil. From hence it is necessary to cross to the right bank of the river, in order to reach the road from Abriés to Queyras, distant $\frac{1}{2}$ hr. from *Ville Vieille*.

A short distance before reaching the latter village the traveller should remark some remarkable pinnacles, similar in appearance to those seen in the Eringer Thal, at Oberbotzen in Tyrol, and elsewhere in the Alps. In the other cases referred to, these pinnacles have been produced by the disintegration of superficial deposits of clay and detritus; which, when protected from rain by large blocks of stone resting on the original surface, gradually form pinnacles, each of them capped by the block to which it owes its formation. In the present instance, they seem to be formed of a friable limestone remaining *in situ* where covered by erratic blocks of diallage rock, and washed away in the interstices.

Information as to the alleged existence of one or more passes from St. Veran to the head of the valley of the Guil is much desired.

ROUTE E.

CASTEL DELFINO TO GUILESTRE, BY COL DE LONGET AND COL DE CRISTILLAN.

	Hours' walking
Ponte Castello	1
La Chianale	1½
Col de Longet	2¼
Col de Cristillan	2½
Ceillac	2½
Maison du Roi	1½
Guilestre	1
	<hr/> 12

As mentioned in § 2, Rte. D, the principal village of the N. branch of the Val Vraita is Ponte Chianale, nearly $\frac{3}{4}$ hr. above the small village of Ponte Castello, which stands at the junction of the Val Chianale with the Val di Vallante. The scenery of the lower part

of the Val Chianale is very pleasing, with bright green pastures enclosed between wooded slopes, but the ridge enclosing the head of the valley is nearly bare. Fully $\frac{3}{4}$ hr. beyond Ponte Chianale is the highest hamlet, *La Chianale*, the Italian custom-house station, where there is a poor inn, containing one bedroom with four beds, and no meat. It is kept by Etienne Martinette, who endeavours by civility to supply the deficiencies of his house. From the village no less than five passes lead into the valley of the Guil (see next Route), while one only, the *Col de Longet*, connects this valley with the Val Maurin and the headwaters of the Ubaye. The pass is also called here Col Maurin; but the name must not be confounded with the true Col Maurin, leading from the village of that name to the Val Maira (§ 2).

The track to the Col de Longet, after crossing and recrossing the main stream, ascends by the l. bank of the torrent which descends from the Col, passing on the l. a very picturesque lake with a chalet beside it. On reaching the summit (8,767', probably higher?) the upper part of the Val Maurin comes into view, treeless, but covered with wide and luxuriant pastures. To the left is seen the summit of the Rioburent, with a small glacier facing the Col, and the stone signal of the Sardinian engineers conspicuous on its summit. This might most easily be reached from the W. side, descending some distance into the Val Maurin before attempting the ascent. 'To reach the Col de Cristillan from the Col de Longet you descend, passing to the rt. of a small lake, as far as the bergerie, which stands at the junction of the Val de Cula of Bourcet's map with the main branch of the Val Maurin. Here turn to the rt., up the Val de Cula to the point where it forks. The rt.-hand branch leads to the Col de la Cula, or Western Col de Longet (see last Rte). Follow the l.-hand branch, ascending over steep pastures until you reach a waste tract covered with mica-schist. Thence bearing

rather to the left, you gain a flat upland valley, with scattered blocks of oxydised serpentine, whereon there is a small pool. The *Col de Cristillan* (9,771', W. M.) is at the head of this valley, and a faintly-marked path leads to it. The views from the Col are very fine. SE. is seen the Rioburent, and beyond it another lofty peak, probably the Pointe de Chambeyron. In the opposite direction, the whole mass of the High Alps of Dauphiné comes into view; and farther to the rt. a singular double-headed peak, probably the Aiguille d'Arves; more distant still are some of the summits of the Tarentaise, and last of all Mont Blanc.

'The descent from the Col is over a steep slope of loose stones, but when once the pastures are reached the path is good, and the walking very easy. The valley is barren and uninteresting till, within a short $\frac{1}{2}$ hr. from Ceillac, it turns to the l., and the path enters a picturesque gorge. At the turn a track to the rt. leads over the mountains to St. Veran. Ceillac is a considerable village, standing at the junction of the Cristillan with the *Melezet*. At the head of the latter valley is a fine rocky peak, partly covered with snow, and called by the natives the Ste. Anna, probably the same as the Pointe des Orches of Bourcet. The rare *Eryngium alpinum* is common in this neighbourhood. In $1\frac{1}{2}$ hr. from Ceillac the mule-track to Guilestre joins the carriage-road to Queyras at La Maison du Roi, 1 hr. from the former village.'—[T. G. B.]

In following the route here described it is better to sleep at Ponte Chianale, where the accommodation is not worse than at Castel Delfino.

ROUTE F.

CASTEL DELFINO TO QUEYRAS—COL
DELL' AGNELLO.

A mule-path $8\frac{3}{4}$ hours' walking.

Of the five passes referred to in the last

Route which lead from La Chianale to the valley of the Guil, two—the *Col Blanchet* (9,544') and the *Col de St. Veran*—lead to St. Veran (Route D); two others—the *Col de Ristolas* and the *Col de la Ruine*—to the head of the valley of the Guil; while the middle pass—the *Col dell' Agnello*, which is the most frequented—leads direct to Ville Vieille, between Abriés and Queyras.

After following the stream above La Chianale for about $\frac{1}{2}$ hr., the track to the *Col dell' Agnello* turns a little to the rt., quitting that which leads to the Col de Longet and to the Col de St. Veran, and then, instead of following the lateral valley which leads to the Col de Ristolas, zigzags up a wooded slope to the left to an upland glen, at the head of which is the Col, $4\frac{1}{2}$ hrs. from Castel Delfino, 8,996 feet in height (mean of observations of French and Italian engineers, and of Mr. Tuckett). The view from the summit is magnificent. The path, which is throughout well traced, descends by an uniform gentle slope along the *Agnel* Torrent to *Fongillarde*, the French custom-house station, 2 hrs. from the Col. The way would be monotonous if it were not relieved by a grand view of the High Alps of Dauphiné. Below Fongillarde a rough char-road leads, in $\frac{3}{4}$ hr., to Moline, $1\frac{1}{2}$ hr. from Queyras, where this route joins that by St. Veran (Rte. D).

SECTION 5.

WALDENSIAN DISTRICT—VALLEYS OF THE PELLICE AND CHISONE.

IN this district we include the Piedmontese valleys lying between the Po and the Dora Riparia, inhabited by the Waldenses or Vaudois, whose heroic resistance to persecution, and final emancipation from all religious disabilities, have excited the lively sympathy of all who know their history. These

valleys do not include mountains of the first order of magnitude; indeed, if we except the Monte Meidassa (10,991'), which separates the head of the valley of the Po from that of the Pellice, there is no point which quite attains to 10,000 feet. Two principal valleys make up the entire district—that of the Pellice, or *Val di Luserna*, which follows a nearly straight course from W. to E., abutting at its upper end on the main chain of the Cottian Alps, which separate it from the Guil, and that of the Chisone, or *Val de Fenestrelle*, which, in the form of a long crook, flows first towards the NW., and then curves round till it returns towards the SE., and enters the plain of Piedmont, near to Pignerol, joining the Pellice a few miles below that town. The Chisone does not drain any portion of the main chain; for the Dora Riparia, with its southern branch, the Ripa torrent, also disposed in the form of a crook, but of larger dimensions, completely surrounds the valley of the Chisone, and cuts it off from the drainage of the main chain. One of the affluents of the Chisone, the Germanasca, does at a single point touch the Cottian chain, and there communicates with the Guil by the Col d'Abriés; but, with this exception, one who would pass from the Val Chisone into France or Savoy must traverse a double rampart of Alps, with the Dora or the Ripa serving as a ditch between them. This singular disposition of the mountains has not been without its influence upon the history of the people during their armed struggle for the defence of their faith and liberties. This district includes scenery of great beauty and variety, and very tolerable accommodation is found in many of the villages, not to speak of excellent quarters at La Tour de Luserne. It is so easy of access by railway from Turin to Pignerol, in 1 hour 20 min., that it has become a sort of outlet from the capital, frequently visited in the summer season by persons seeking recreation and change of air.

ROUTE A.

PIGNEROL TO MONT DAUPHIN — VAL
DI LUSERNA.

	Hours' walking	English miles
La Tour de Luserne	2½	9
Bobbio	2½	7½
Col de la Croix	4	10
Abriés	2½	6½
Mont Dauphin	7	23
	18½	56

Pignerol, or *Pinerolo* (Inns: Corona Grossa, pretty good; and several others), is a large straggling town, connected by railway with Turin: 4 trains daily, in 1 hour 20 min. An omnibus for La Tour de Luserne starts half an hour after the arrival of (every?) train. It travels very slowly, by a hot dusty road, so that time is saved by engaging a light carriage. About 8 miles from the town is the first Vaudois village,

San Giovanni (Inn: Bonne Femme, looks clean and decent); and 1 m. farther, at the opening of a richly wooded valley, is the principal village, or rather town, of the Vaudois,

La Tour de Luserne (Inns: L'Ours, clean and comfortable; Lion d'Or, also good), a thriving place, with much appearance of prosperity. The people of these valleys appear to be a steady and industrious race, but the results of their own industry have been largely increased by liberal contributions from England and other Protestant countries, by means of which a handsome church, a college, a hospital, an orphanage, and other institutions have been established here during the last 25 years. French, being the language of their church service, is universally spoken among the Vaudois; and this, to strangers, is a decided improvement upon the Piedmontese dialect spoken in the neighbouring valleys.

Jean Henri Tron has been recommended as a guide in this district. He is a steady respectable man, who knows the mountains well, but he would not be found useful in expeditions of any difficulty. Guides fit for adventurous

undertakings are scarcely to be met with in this part of the Alps.

The neighbourhood of La Tour abounds in rich and beautiful scenery; those who do not intend to pass by that route to Perouse, should not omit to make an excursion into the Val Angrogna (Rte. C). The botanist will be pleased to see the rare *Campanula elatines* growing abundantly in shady situations in these valleys.

From La Tour to Bobbio there is a rather rough char-road along the left bank of the valley; but as the ascent is considerable — more than 1,000 feet — little time is saved to a pedestrian by taking a vehicle. On the way are fine views of the higher summits of the neighbouring Alps, which are here known apparently by other names than those used elsewhere. The highest peak seen at the head of the valley, separating it from the Val Germanasca, is called *Mont Palavas*; the Monte Meidassa, or the highest point of that mountain visible from this side, is called *Mont Grenier*; while the peak conspicuous to the S. towards the valley of the Po is the *Mont Frioland*. A little above the hamlet of *Villar* a glen opens on the S. side of the valley, called *La Combe des Charbonniers*, through which *Crissolo* (§ 4, Rte. A) may be reached in about 5 hrs., passing over the ridge of the *Sea Bianca*. On either side of the mountain, at a height of about 6,000 feet, may be found *Arabis pedemontana*, a plant not known to exist elsewhere. On the upper part of the ridge are many other rare plants; e.g. *Pedicularis rosea* and *fasciculata*, *Saxifraga retusa*, &c.

Bobbio (2,838'), 2½ hrs. from La Tour, has no inn. Bartolomè Peyrotte, of this village, accompanied Mr. Tuckett in the ascent of Monte Viso, as porter. He was found active and useful, and his terms moderate. Jacques Raymond has also been recommended as a guide. From hence to La Monta, near Abriés, there is nothing but a rough mule-path. [A short distance above Bobbio, a path mounts rapidly on the

N. side of the valley to the *Col Julien*. The summit, 4 hrs. from Bobbio, is said to command a magnificent view of the Monte Viso and the adjoining peaks. From thence, Pralis, in the Val Germanasca (Rte. D), is reached in 2 hrs. of rapid descent.]

Above Bobbio, following the mule-track to the Col de la Croix, a massive stone embankment is seen, which was constructed by a grant from Oliver Cromwell, to protect the village from the inundations of the Pellice. A short distance farther the track crosses to the rt. bank of the torrent, and begins to mount more steeply as the valley gradually contracts, and at length becomes a mere ravine, partly closed by huge masses of rock fallen from the mountain above. In the wildest part of the gorge are seen the ruins of the fort of *Mirabouc*, constructed to guard this entrance into Piedmont. The track, which has before this returned to the l. bank of the Pellice, formerly passed through one of the gates of the fort, and it appears as if no other passage could be found along the precipitous rocks which enclose the valley. [From hence it is possible to reach Abriés by either of two passes, shorter, but more difficult, than the Col de la Croix—the *Col de Malaure*, and the *Col de l'Orine*; they are of about equal height, and, with a guide, half an hour may be saved by following either of them. The Col de Malaure passes to the N. side, the other Col to the S. side of the Mont Palavas; both are approached through the lateral valley of Crousena. 3 hrs. are required to reach the summit from Mirabouc—2 hrs. from the summit of either Col to Abriés.] The valley of the Pellice makes an abrupt turn above Mirabouc, mounting nearly due S. in the direction of Monte Viso. In less than 3 hrs. from Bobbio the traveller reaches a group of châteaux, called *Pra*, where provisions and very tolerable accommodation may be found for the night, by a hunter or naturalist wishing to explore the neighbourhood. The Monte Meidassa (10,991') is said

to be accessible from the head of the valley, and the view is probably second only to that from Monte Viso. [2½ hrs. from Pra, following the stream of the Pellice to its source, is the summit of *Col de Seylières* (9,247'—[W.M.]), also called *Col de Chevallet*. The scenery of head of the valley is very fine, and this is the shortest and most agreeable way for approaching Monte Viso from the Vandois valleys. The châteaux of La Ruine may be reached in less than an hour from the summit, and the Col de la Traversette in even less time (see § 4, Rte. A)].

The ascent to the *Col de la Croix* commences close to the Bergerie de Pra, mounting steeply in zigzags—1¼ hr. steady walking. From the summit (7,611') there is a fine view of Monte Viso, seen over the Col de Seylières, and of the defile of Mirabouc. An ancient stone, carved with the fleur de lys and the cross of Savoy, marks the frontier of France. The top of the pass is nearly level for about a mile, and the descent on the side of France easy and gradual. At La Monta the track joins the char-road, which leads in about 4 m. to Abriés, and from thence to Guilestre and Mont Dauphin. The road is described in § 4, Rte. A.

ROUTE B.

PIGNEROL TO CESANNE—VALLEY OF THE CHISONE—COL DE SESTRIÈRES.

	Hours' walking	English miles
Perouse . . .	3½	12
Fenestrelle . . .	3	9
Pragelas . . .	2½	7
Sestrières . . .	1½	4½
Cesanne . . .	2½	8
	13	40½

The valley of the *Chisone*, or *Clusone*, as far as the foot of the Col de Sestrières, is traversed by the post-road which is carried over that Col to Cesanne, in the valley of the Dora, on the

Italian side of the Mont Genève. The main valley, and especially its tributaries, the Val de S. Martino and the Val Germanasca, abound in beautiful scenery, and will well reward some days devoted to exploring their recesses and the ranges which enclose them. The lower part is usually called *Val de Perouse*, but sometimes *Val de Fenestrelle*. The upper part is known as *Val Pragelas*. The road to Cesanne enters the valley and approaches the l. bank of the Chisone at a short distance from Pignerol. On the l., at the opposite side of the valley, is seen the Vaudois village of *S. Germano*, niched in a hollow of the mountain, and above it the hamlet of *Pramol*. There is no difficulty in crossing the ridge which separates Pramol from the Val Angrogna, and by this detour a pedestrian may lengthen the way from Pignerol to La Tour de Luserne in a very agreeable manner.

Between Porte and Villar, about half-way to Perouse, the high-road passes close to some very extensive quarries, of which the most important are at a place called *Malanaggio*. The gneiss, which is developed here on a great scale, is extremely varied in its mineral structure, and some of the beds furnish stone which is highly valued for architectural use. Huge blocks have been extracted for the columns of the new church on the Po, and other public buildings in Turin. Advancing farther up the valley, the gneiss gives place to a schist composed almost exclusively of black mica; and at various points in the ranges which enclose the valley, especially at the Col de l'Assieta, serpentine appears in great masses, and, as usually happens, seems to have modified the mineral character of the rocks which it approaches. About 12 miles from Pignerol is

Perouse (2,037') (Inns: Sole; Auberge National), a small town, but the most considerable in the valley. It stands opposite to the opening of the Val de St. Martin, through which the Germanasca torrent descends to join the

Chisone. For passes leading to La Tour de Luserne, Abriés, and Pragelas, see Rtes. C, D, and E. The road, which had hitherto been nearly level, mounts considerably in the next portion of the valley. Several small hamlets, surrounded with rich vegetation, are passed; at one of them, called *Villaret*, is a mule-track, which leads in 3 hrs. to the *Col della Rossa*, and in 3 hrs. more to *Giaveno*, on the *Sangone* torrent, a short distance from the railway between Susa and Turin. For a long period the Vaudois were not permitted to settle in the main valley of the Chisone, being restricted to the valleys of Luserne and St. Martin, with their tributary branches; but since 1848 all religious disabilities have been removed, and many of them have settled in the valley of Fenestrelle, besides others who have been attracted to the capital. In spite of the considerable ascent in this stage of the valley, it enjoys a highsummer temperature, and the vine and mulberry both flourish as far up as

Fenestrelle (Inn: said to be bad and dirty), a poor village which crouches beneath the imposing works of the *Fort of Fenestrelle*. This is supposed to be one of the strongest, as it is certainly one of the most considerable, fortresses on the frontier between France and Italy. The works rise one above another in successive ranges on the steep southern slope of the valley, the highest battery being approached by a gallery, said to contain 3,600 steps. Four detached forts command the approaches, and nothing that military science could suggest has been omitted in the defence of this route into Italy; but it may well be doubted whether, in case of need, they would be of the slightest avail against a neighbour who is master at once of the routes of the Cenis and the Col di Tenda. In the neighbourhood of the village are seen the remains of former fortifications, destroyed by the French in 1796, and of others still more ancient, constructed to defend the approaches from the side

of Piedmont, when this valley belonged to France.

[The pass of the *Col de la Fenêtre*, over the range N. of Fenestrelle, which separates the valleys of the Dora and the Chisone, leads to Susa in 5 hours. It is an extremely agreeable and interesting walk, commanding from the summit an admirable view of the peaks on either side of the Mont Cenis pass.]

Above Fenestrelle the valley becomes more Alpine in character. About half way to Pragelas, at the hamlet of *Pourières*, a track mounts to the right, leading by the *Col de l'Assieta* to Exilles. This is a very interesting expedition, practicable for horses, and requiring not more than 5 hrs. The summit is a plateau of considerable extent, which was repeatedly the scene of military operations during the wars between France and Piedmont. The views of the opposite range, from the Mont Tabor to the Roche Melon, are magnificent. The remains of redoubts are seen in many places; and in a depression of the plateau, called the Vallon des Morts, the bodies of many hundreds of brave men lie buried.

The last village in the valley is *Sestrières*, from whence the road mounts in zigzags to the Col, a nearly level plain two miles long, commanding a fine view of the Mont Albergian. The descent is by long windings to the level of the Dora, which is crossed to reach Cesanne. On the opposite slope, W. of that village, the road of Mont Genève is seen winding up the valley which leads to the pass (see § 6, Rte. A).

ROUTE C.

LA TOUR DE LUSERNE TO PEROUSE —
VAL ANGROGNA.

This is a very agreeable walk of from 5 to 6 hours, passing through scenery which, for combination of rich forest vegetation, bold rocks, and sparkling

torrents, can scarcely be surpassed. About $2\frac{1}{2}$ hrs. from La Tour is the defile of *Pra del Tor*, famous in Vaudois history; from thence it is easy to reach *Pramol* by a low pass, and then to descend into the valley of the Chisone 3 m. below Perouse. A second path leads along the crest of the hills (in great part covered with forest) which divide the lower Val de St. Martin from the Chisone; while a third and rather longer way follows the Angrogna torrent nearly to its source, and thence by a low Col passes into a lateral glen of the valley of St. Martin, descending to Faetto, on the S. side of the torrent, opposite the large village of Perrier.

ROUTE D.

PEROUSE TO ABRIÉS, BY THE VAL
GERMANASCA.

9 hours' walk — about 24 English miles.

Opposite to Perouse is the opening of the Valley of St. Martin, through which the united torrents from three Alpine valleys are poured into the Chisone. An easy ascent leads in less than 2 hours to *Perrier*, or *Perrero*, the chief village of the valley. Here resides Dr. Rostan, an excellent botanist, to whom the Editor is indebted for valuable information as to this district. He will be happy to assist, with information or advice, travellers who may desire to explore the neighbouring valleys. A mile above Perrier the valley divides. One branch, descending from the Albergian towards the SE., is the proper Val de St. Martin; but the upper extremity is called Val de Massel. The other branch of the valley, through which the Germanasca flows to NE., is the *Val Germanasca*. A branch of the latter, mounting nearly due W., is called *Val Rodoret*.

The way to Abriés lies through the Val Germanasca. The principal village is *Pralis*, 4 hrs. from Perouse, consisting of four hamlets. In the second

of these is the pastor's house, where, there being no inn, lodging may usually be obtained. The scenery of the Val Germanasca is very fine, especially the upper part, from whence there is a pass into the Val Pellice by the Col Julien, noticed in Rte. A, and another to the W.—the *Col Frapier*—leading into the valley of the Ripa. The path leading to this latter Col leaves the track to the Col d'Abriés 2 hrs. above Pralis. The Col d'Abriés is a frequented pass, used even in winter; it commands no distant view. The summit is 3 hrs. from Pralis, and the descent, passing the village of Roux, requires 2 hrs. more to reach Abriés. Starting early from Perouse, it would not be difficult to reach Queiras, or even Guilestre, on the same day. The distance is about the same as from La Tour de Lucerne, and in point of scenery this is, perhaps, the finer of the two passes.

ROUTE E.

PEROUSE TO PRAGELAS — VAL DE MASSEL.

9 hours' walk. 10½ hours to Fenestrelle.

This route involves a considerable detour, but leads through some of the finest scenery of this district, and over ground which is full of interest to the naturalist.

From Perrier (see last Rte) the track follows the NW. branch of the Val de St. Martin, reaching in 1½ hr. the village of *Massel*. 1 hr. farther is *Balsille*, above which, on a shelf of the mountain, is the place called *Castella*, where the Vaudois, under Arnaud, held out for three days against the united armies of France and Piedmont. The upper end of the valley is closed by the fine peak of the Albergian (9,990'), which is accessible from this side. The *Col du Piz*, on the S. side of the peak, leads to Pragelas; while the *Col Albergian* (8,816') passes by the E. side of the mountain to the valley of the Chisone, a little above Fenestrelle.

About 3 hrs. suffice to reach the summit of either pass from Balsille. The descent to Pragelas occupies 2 hrs., but 3¼ hrs. are required to reach Fenestrelle from the Col Albergian. Both are fine passes, but the latter is said to command a finer view.

ROUTE F.

PEROUSE TO CESANNE, BY RODORET.

About 1¼ hr. above Perrier the Germanasca receives an affluent from the W., through the *Val Rodoret*. Near the junction is the village of *Rodoret*, or *Rodoretto*, 3½ hrs. from Perouse. From the head of this valley two passes lead to the westward. One of these—the *Col della Valletta*—2½ hrs. from Rodoret, descends into the head of the valley of the Chisone to Sestrières, reached in this way in 8½ hrs. from Perouse—not more than 11½ m. in a straight line, whereas the distance by this route, must be fully 25 miles. The *Col de Rodoret*, 3 hours from Rodoret, lying at the extreme end of the valley, crosses the ridge which separates the Germanasca from the Ripa—the principal source of the Dora Riparia. The path descends, not far from the source of the Ripa, nearly at the same point as that from the Col Frapier (Rte. D). At least 4½ hrs. are required to reach Cesanne; in all, 11 hrs. from Perouse.

SECTION 6.

GENÈVRE DISTRICT.

Two of the most copious streams of the western Alps—the *Durance* and the *Dora Riparia*—have their sources at the angle formed by the Cottian Alps to

the S. and S.E. of the Mont Tabor. Both the Durance, which drains the western or outer side of the angle, and the Dora, descending from the inner or E. face, divide towards their origin into several streams, whose general direction is parallel to the dividing chain. Thus the Durance is formed near Briançon, by the union of the *Clairée* and *Guisanne* torrents, flowing from the NW., with the *Cerveyrette* from the SE. By a nearly similar arrangement, the Dora Riparia owes its origin to the confluence near Cessanne of the torrents flowing through the parallel valleys of the *Ripa* and *Thures*, both from the SE., and receives at Oulx, from the NW., the more abundant stream which descends through the valley of Bardonnèche. This unusual disposition of the valleys, which, instead of radiating from the dividing ridge of the Alps, form a series of trenches parallel to it, corresponds to the portion of the Alpine chain which probably has the lowest mean elevation, and which, with the single exception of that great breach indicated by the valley of the Adige, has the lowest passes in the entire range from Carniola to the Mediterranean. The Mont Genève (6,102') and the still lower pass of the *Col des Echelles* (5,873') would undoubtedly have been the main channels of communication between France and Italy, if the valley of the Durance were not divided from that of the Rhone by the great mass of the Dauphiné Alps.

In the present section we include the portion of the main chain lying on either side of the Mont Genève, along with the minor ranges that intervene between the Guisanne and Bardonnèche on one side, and between the Durance and Ripa on the other. The entire length of this tract, from the Mont Tabor to the head of the Val de Thures, near Abriès, is about 30 English miles.

ROUTE A.

SUSA TO BRIANÇON, BY THE MONT GENÈVRE.

	Kilometres	English miles
Exilles	12	7½
Oulx	12	7½
Cessanne	8	5
Mont Genève	10	6¼
Briançon	12	7½
	<hr/> 54	<hr/> 33¾

The portion of this route between Susa and Oulx properly belongs to the next §, but is most conveniently included here.

Diligences run daily from the railway station at Susa, employing at least 8 hours to reach Briançon. Between Cessanne and Briançon, a pedestrian, taking advantage of the short cuts, may travel more quickly than the diligence.

For about 6 miles from Susa the road keeps to the right bank of the Dora, usually at some height above the river, through a valley well planted with walnut trees, and here and there gaining glimpses of the high peaks to the N. It passes to the left bank a short way below the defile in which stands the Fort of *Exilles*, which completely commanded this road from France into Italy, but is now rendered useless since France possesses the crest of the Mont Cenis. In the village of Exilles tolerable accommodation and civility were found a few years since at the house of the postmaster.

2½ m. above Exilles is *Salabertrand*, or *Salbeltrand*, the site of one of the Vaudois victories, under the leadership of Henri Arnaud. 5 m. farther is *Oulx* (3,514'), a large village at the junction of the Bardonnèche with the Dora, considerably increased in importance since the works for the great tunnel have been in operation (see Rte. F). This part of the valley, sometimes called Vallée d'Oulx, is very interesting to the botanist. *Astragalus austriacus*, *Prunus brigantiaca*, *Centranthus angustifolius*, and other very

rare species are found in the valley, and the Alpine ranges on either side are not less rich.

The last village in the main valley is *Cesanne* (4,419'), where there are two or three poor inns. Here the road from the Col de Sestrières and the paths from Servières and Abriés (Rtes. B and C) converge.

[To the NW. is the *Mont Chaberton* (10,258'), the highest of the neighbouring summits, which may be easily reached in 4 hours from Cesanne. The peak is nearly isolated from all the surrounding ranges by the Ruisseau Sec on the W., and another torrent to the N., which joins the Dora at the hamlet of Fenils, between Oulx and Cesanne. An unfrequented pass, the *Col de Chaberton*, connects together the head of the Ruisseau Sec with that of the Vallon des Fenils. From the Col it is easy to reach the summit, which lies nearly due S. The way by the Ruisseau Sec is somewhat easier than that by Fenils.]

The high road from Cesanne to the Mont Genève winds along the slopes of loose débris that cover the S. base of the Mont Chaberton, making a considerable detour before it gains the height of the pass. This lies over an undulating plateau, nearly level at the summit, where stands an obelisk marking the completion of the road in 1807, and the village of *Bourg Mont Genève*, with the French douane, 6,102 feet above the sea. The new road descending into the valley of the Durance is very well constructed, and its long windings present interesting and varied views of the neighbouring Alps, and of the city of Briançon with its picturesque forts. The pedestrian will, however, prefer the old road, which descends much more directly, through a pine forest, along the l. bank of the petty stream from the plateau, which is sometimes treated as the proper source of the Durance. Both roads reach the valley of the Clairée at the hamlet of La Vachette, about 2 m. above

Briançon (Inns: Ours, tolerable;

Hotel de la Paix, dirty, but good *cuisine*), a very small city, and a fortress of the first class, 4,334 feet above the sea. There is nothing in the town to attract a stranger; but the forts which encompass it, and are even carried up the neighbouring peaks, deserve a visit, although their height has been strangely exaggerated. Permission must be obtained from the commandant of the fortress. The largest is the Fort des Trois Têtes; on the same level is Fort Dauphin; and 300 feet higher, overlooking the Durance, is Fort Randouillet. Above these are the Fort d'Anjou and the Pointe du Jour, the latter 1,276 feet above the town. On the very summit of the *Mont Infernet* (7,808') are the remains of redoubts thrown up in 1814. For the Rte. from Briançon to Grenoble, see § 8.

ROUTE B.

QUEYRAS TO BRIANÇON—COL D'IZOUARD.

7½ hours' walk by the Col d'Izouard.

For a pedestrian going from the valleys of Monte Viso to Briançon, this route is much preferable to that by Guilestre and the Durance. The scenery is wild and singular rather than grand, but the district traversed is in many ways interesting, especially to a naturalist.

From Queyras (§ 4, Rte. A) a char-road leads in 1¼ hr. to *Arvieux* (5,105'), on the *Rivière* torrent. From thence a mule-track mounts to Brunisard, the highest village. The valley here forks. One branch leads NW. to the *Col des Ayes*, over which a path passes by the Châlets des Ayes to Villar St. Pancrace, near Briançon. This is probably a shorter but more difficult way than that by the N. branch of the valley terminating in the *Col d'Izouard*, which is throughout practicable for mules, and may be reached

in $2\frac{1}{2}$ hrs. from Arvieux. 'The last part of the ascent is exceedingly wild and curious, the track winding through vast masses of perfectly bare rock of bright red and reddish-yellow sandstone, now worn down into enormous screes, now varied by immense blocks of fantastic shapes, chiefly needles, but often the most grotesque and irregular pillars. The scene was perfectly solitary and silent, and very weird and striking.'—[E. L.] The view from the summit (about 8,000') includes a portion of the snowy range of Dauphiné, and some fine peaks W. of Monte Viso. On the N. side is a new building, built for a refuge in bad weather, where bread and wine may be obtained. The descent, at first NW., then due N., reaches the *Cerveyrette* torrent at the village of *Cervièrès* (5,064'). [From hence there is a little frequented pass to Cesanne, by the *Col de Bousson* (7,006'), also called *Col de Cerveyrette* (3 hrs. to the Col, 3 hrs. from thence to Cesanne).] Below *Cervièrès* the valley descends WNW. to Briançon. The rocky slopes preserve throughout the same arid character, although there is an abundance of running water in countless streams. About $3\frac{1}{2}$ hrs. are required for the descent from the Col to Briançon.

ROUTE C.

ABRIÉS TO CESANNE.

About $7\frac{1}{2}$ hours by the Col de Thures— $8\frac{1}{2}$ hours by Col de la Mait.

Owing to the remarkable convergence of many valleys, that seem to radiate from a point near to Abriés (§ 4, Rte. A), that village is the centre from whence many paths lead to as many Alpine passes. Three passes into the Val Pellice are described in § 5, Rte. A; another—the Col d'Abriés—is noticed in the same section, Rte. D; two more, leading to Cesanne through the Val de Thures, or through that of the

Ripa, naturally fall within this section; and a seventh pass, known to the innkeeper at Abriés, and said to be impracticable for horses, leads to the head of the valley of the *Cerveyrette*, joining the Rte. last described at the village of *Cervièrès*. Information as to this, as well as the two following passes, is desired.

The shortest way from Abriés to Cesanne is by the *Col de Thures*, through the westernmost of the two parallel valleys that unite near Cesanne, with the torrent from the Mont Genève, to form the Dora Riparia. In 2 hrs. from Abriés the mule-path reaches the summit of the Col, and from 5 to 6 hrs. are required for the long descent from thence to Cesanne.

Farther E., and more distant from Abriés, is the *Col de la Mait*, which leads from a tributary glen of the valley of the Guil to the valley of the Ripa. Nearly 3 hrs. are required for the ascent from Abriés. On the opposite side of the Ripa torrent, here near to its source, are the two passes of Frapier and Rodoret, described in the last section. The former, which is nearest to the head of the valley, may be reached in 1 hr. from the Col de la Mait, but the Col d'Abriés offers a nearer and more interesting way from Abriés to the Val Germanasca. The descent through the valley of the Ripa is at least as long as that from the Col de Thures; the path is rough, but practicable for horses, and not very interesting in point of scenery.

ROUTE D.

BRIANÇON TO ST. MICHEL — COL DE GALIBIER.

About 13 hours' walk.

Briançon is the centre of a considerable passenger traffic along three great roads—that of the valley of the Durance, leading down to the plains of Provence; the easy pass of Mont

Genèvre, into Piedmont; and the road for Grenoble and Lyons, almost equally accessible by the Col du Lautaret. The intercourse with Savoy to the N. is on a far more limited scale, although practicable passes lead to the valley of the Arc from each of the two main branches of the Durance—the Clairée and the Guisanne. The best known of these passes is the Col de Galibier, which is generally considered the limit between the Cottian and the Dauphiné Alps.

The valley of the Guisanne, traversed by the high-road from Briançon to Grenoble, is described in § 8, Rte. A. A guide and horse for the Col de Galibier may be engaged at Monestier, or at the little inn at Le Lauzet, about 1 hr. farther up the valley of the Guisanne.

[From Le Lauzet a path mounts along the *Rif* torrent to the *Col de la Ponsonnière*, a rather shorter but more laborious pass to St. Michel than that here described. The path joins that from the Col de Galibier about 1 hr. before reaching Valloires.]

The way to the *Col de Galibier* follows the high-road to a point about half-way between La Madeleine and the summit of the Col du Lautaret, and then mounts steeply along the torrent which descends from the NW. until, in 2 hrs. from Le Lauzet, it attains the summit of the Col. This is 9,154 feet above the sea, and commands a magnificent view to the S., extending from the Mont Viso to the snowy peaks of the Pelvoux-group. On the side of Savoy the prospect is also wild and striking, but more confined. The Col lies about half-way between the *Pic des Trois Evêches* (10,236') to the W., and the *Roche du Grand Galibier* (10,637') to the E. The Col de la Ponsonnière lies about an equal distance to the E. of the last-named peak. In about 2½ hrs., descending from the Col, the track reaches the village of *Valloires*, where the torrent of Valloire receives a considerable affluent from a lateral valley which mounts to the SE., and communicates by a high and difficult pass (*Col de*

l'Aiguille Noire?) with the head of the valley of the Clairée. The little inn at Valloires is sometimes closed in summer, when the villagers are occupied with their cattle on the upper pastures. 2 hrs. farther is *St. Martin d'outre Arc*, where bread and wine may be obtained. 'The distance from St. Martin to St. Michel looks nothing on the map, but our guide assured us it was 3 hours, and the last part of the way execrable. We pushed on rapidly up a steep hill, from which we enjoyed a beautiful sunset view of the valley and the mountains enclosing it. Darkness quickly fell, and the road during our 2 hours' descent to St. Michel fully justified its reputation. To ride even by daylight would have been impossible, the road was so steep and stony, and in several parts completely cut up by streams.'—[E. L.] In taking this pass from Monestier, fully 10 hrs. should be allowed, exclusive of halts—3 hrs. for the ascent, and 7 for the descent from the Col to St. Michel (§ 7, Rte. A).

ROUTE E.

BRIANÇON TO MODANE—MONT TABOR.

Nearly 11 hours' walk to Modane.

The direct route from Briançon to Modane, or the upper valley of the Arc (see § 7, Rte. A), involves two passes over the main chain between France and Piedmont, but is, nevertheless, rather shorter and less laborious than the pass described in the last route to St. Michel. The Col des Echelles, between the valley of the Clairée and Bardonnèche, is the lowest in the entire chain of the Alps, excepting only the two great gaps that lead from the valley of the Adige to that of the Inn; and the Col de la Saume, by which the passage from Piedmont into Savoy is here accomplished, is easy and tolerably frequented, so that in fine weather a guide is not required on this route.

From La Vachette, where the high-road of the Genèvre leaves the banks of the *Clairée*, a char-road mounts through the valley of that torrent, sometimes called *Val de Névache*, to *Planpinet*, 3 hours from Briançon. The ascent is very gentle, as *Planpinet* is but 576 feet above the city. Less than a mile above the village a frequented horse-track mounts to the right, towards the *Col des Echelles de Planpinet*, the summit of which is but 5,873 feet above the sea. On the N. side of the pass is a rock, which resembles a gigantic tower. The descent is perfectly easy on the N. side, and leads into the *Valétroite*, a narrow glen through which the *Bridoire* torrent descends from the Mont Tabor to join the three other streams which meet at *Bardonnèche* (Rte. F). At the base of the descent, the track from the Col falls into a char-road, and encounters the signs of human industry, which has here been actively stimulated by the great works in progress connected with the tunnel through the Alps. The water of the *Bridoire* has been used to work some of the machines, and lime-kilns and workshops have arisen in this wild and remote glen. From this point, *Bardonnèche* may be reached in 1 hr., and it would be easy to take that place on the way to *Modane* (see next Rte.); but the more direct course mounts to the NW., along the *Bridoire* torrent, which is crossed several times, to the poor hamlet of *Valétroite* (about 3 hrs. from *Planpinet*), where the char-road comes to an end. From hence, the summit of the Mont Tabor is seen at the head of the valley, but presents a less imposing appearance than the nearer peak of *La Muande*. Above *Valétroite* the torrent is crossed by a wooden bridge, and soon after the path to the *Col de la Saume* begins to ascend rather steeply, through a lateral glen which opens to the N. About 1½ hr. suffices to gain the summit, from whence some of the peaks of the *Pelvoux* group are visible over the intervening ranges. On the N. side of the

Col are two small lakes, below which the descent, a little E. of N., is very easy, over grassy slopes, passing the *châlets* of *Replanetta*. A path mounting to the E., over a low col, connects this pass with that of *La Roue* (Rte. F). Lower down is a group of *châlets*, called *La Louze*, below which a more rapid descent on the rt. bank of the torrent leads in 1 hr. from the Col to the opening of a lateral valley on the rt., leading to the *Col de la Roue*. 15 min. lower down the path crosses a very picturesque and partly natural bridge. Nearly 1 hr. farther on, and above the junction of another torrent from the rt., is the chapel of *Notre Dame de Charmet*, a sanctuary long celebrated in the district of *Maurienne*. From hence a char-road leads to *Modane*, bearing round the slope of the mountain, in a NW. direction, through a pine forest, where the pedestrian may shorten his way by a judicious choice of short cuts. Gaining here and there a glimpse of the glaciers N. of *Modane*, and of those of the *Grandes Rousses* to the W., the traveller reaches *Modane* (§ 7, Rte. A) in 1 hr. from the Chapel, or about 3¼ hrs. from the Col. Four hours are necessary for the ascent on this side.

The *Mont Tabor* (10,436') is at the same time one of the most favourable points for a panoramic view of the western Alps, and one of the most easily accessible of the higher summits. It is most conveniently ascended from *Bardonnèche* by the *Valétroite*, but may also be reached from *Modane* by the *Col de la Saume*, or from *St. Michel* by way of *Valmeinier*. In the ascent from *Bardonnèche*, the char-road through the *Valétroite* is followed, as far as the highest *châlets*, 2½ hrs. When these are passed, instead of mounting the lateral valley which leads to the *Col de la Saume*, the ascent continues due NW. through the gorge of the *Bridoire*. The path ascends steeply by zigzags on the right side of the torrent, above the narrow cleft through which it forces its way. In ¾ hr. the

upper pasturages of the valley are gained, and these are succeeded by another long and steep ascent, leading to a wild hollow enclosed on the left, or SW., by the precipices of the Muande. The way follows the torrent, which flows at the base of enormous piles of débris fallen from these cliffs, until in about 1 hr. farther a point is gained which overlooks a small lake of deep blue water, half choked by the huge blocks that fall into it from the N. face of the Muande, which from this point is a very grand object. Keeping to the S. side of the lake, the ascent continues nearly due W. over piles of débris, till in about $2\frac{1}{2}$ hrs. from Valétruite the crest of the *Col de la Muande* is attained. This is a depression in the ridge extending S. from the Mont Tabor to the Mont Chaberton, and dividing the tributaries of the Dora from the Clairée. The view is already very extensive. Descending a little from the Col, and bearing to the rt., a stream is crossed near to where it issues from a snow-rift of the Mont Tabor, and the ascent towards the summit is thenceforward by a well-traced path, marked at intervals by crosses, and the little chapel which stands on the highest platform of the mountain comes distinctly into view. About $\frac{3}{4}$ hr. from the Col, the edge of the upper snow-field is attained. As this is usually very soft, and undermined by streamlets, it is usual to bear a little to the left in order to avoid the steeper part of the snow-slope. There is no difficulty whatever in the ascent, which might even be accomplished on mule-back. The last portion of the ascent is, however, fatiguing, from the adhesive nature of the soil, composed of mud mixed with half-melted snow. The chapel, which is often visited by pilgrims in the month of September, is a short distance from the pyramid erected in 1822, a short distance W. of the chapel, by the officers engaged in geodesic operations. The panorama from the summit includes all the higher peaks of the western Alps. Among the re-

markable objects nearer at hand, is the head of the *Valmeinier*, with a dark lake, one of twelve that are reckoned in that wild valley. The summit is reached in $1\frac{1}{2}$ hr. from the Col de la Muande, or $6\frac{1}{2}$ hrs. from Bardonnèche. The descent to that place may be effected in 4 hrs.

In making the ascent from Modane, it is necessary to begin by reaching the Col de la Saume (4 hrs.). Descend a short way on the S. side, and, instead of following the regular track to Valétruite, bearing to the rt. across stony pastures, you reach in 20 min. a hollow recess in the mountain, by which it is possible to attain the summit in a nearly direct line; but it is an easier course to bear to the left, over piles of quartz blocks, and mount towards the Muande, till near the little lake at its base, when, as in the way above described, the ascent is continued to the crest of the Col de la Muande, $1\frac{1}{2}$ hr. from the Col de la Saume. From Modane to the summit rather more than 7 hrs. are requisite, and 6 hrs. for the descent.

A third way to the summit is from the Valmeinier, which pours its torrent into the Arc, close to St. Michel. A rapid ascent leads from St Michel to the mining village of *Valmeinier* (4,838'), and, after passing two or three hamlets farther up the valley, attains the chapel of Notre Dame des Neiges (7,185'). From thence the track descends to cross a gully, and then mounts gently over green pastures on the rt. bank of the torrent. A small glacier must be crossed to gain the ridge of the mountain. From Valmeinier the ascent is made in about 6 hrs.; the descent requires $4\frac{1}{2}$ hrs.

Guides may be found at Bardonnèche and at Modane. At the latter place, Pierre Antoine Glain is recommended; pay, 6 to 8 fr. per day.

ROUTE F.

MODANE TO CESANNE — TUNNEL
THROUGH THE ALPS.

9½ hours by the Col de Fréjus; 10¾ hours by the Col de la Roue.

Besides the Col de la Saume, described in the last Route, two other passes lead more directly from Modane to Cesanne, or to Susa, by Bardonnèche. These passes have attracted much attention since the commencement of the great tunnel which is to open a passage for the railway from Chambéry to Turin, under this portion of the chain. It is often improperly called the Tunnel of the Mont Cenis, although separated from that pass by the great peak of the Mont d'Ambin, with its glaciers, and very nearly 16 miles farther W.

1. The shortest path from Modane to Bardonnèche lies over the Col de Fréjus; but it is rough, and fit only for a pedestrian. The track leading to the Col de la Saume (see last Rte.) is followed to the chapel of Notre Dame de Charmet, and for 35 min. farther (in all 1¾ hr. ascending) to a stone bridge crossing a stream which descends from SSE. through a picturesque glen called La Combe d'Arrionda. The ascent up that glen is at first easy, crossing pastures under which, at a depth of some 1,600 or 1,800 feet, the tunnel is hereafter to pass. At the head of the glen a very steep slope leads up to the *Col de Fréjus*, 2 hrs. from the bridge, and 3¾ hrs. from Modane. The railway engineers have constructed a belvedere on the crest of the ridge, a little E. of the Col. 1½ hr. of rather rapid descent through a barren glen leads down to

Bardonnèche (Inns: La Percée des Alpes; Italia; Fréjus) Owing to the number of visitors, it is often difficult to find a room. This was until lately a neglected Alpine village, about 4,260 feet above the sea; but now a place of great resort and of industrial activity, owing to the works in progress for piercing the tunnel. The position, in a fertile valley at the junction of four

streams—that of the Melezet, from Valétroite (Rte. E); those from the Col de Fréjus and Col de la Roue; and that of Rochemolle, from the NE.—is agreeable and picturesque. The ruins of an ancient castle overlook the village. A good road leads from Bardonnèche to Oulx, nearly 7 m. (2¼ hrs.); from thence to Cesanne is 5 m. by the high road of the Mont Genève; or 15 m. to Susa, if the traveller wish to descend into Piedmont.

2. A much easier but longer way from Modane to Bardonnèche is by the Col de la Roue. Instead of turning off to the l. from the path to the Col de la Saume, at the opening of the Combe d'Arrionda, the main valley is followed for about 1 hr. farther to the opening of another glen, also on the l. hand in ascending, close to some chalets called Pra de Riou (2¾ hrs. from Modane). After mounting through some stunted pines, the path lies over open pastures to another group of chalets called Fontaine Froide, 1½ hr. from Pra de Riou. A further ascent of half an hour, by a path which even in winter is well marked by poles, leads to the summit of the *Col de la Roue* (8,334'), one of the most easily accessible passes of the Alps (4¾ hrs. from Modane). The descent lies through a treeless and dreary glen, leading in 2 hrs. to Bardonnèche.

The *Tunnel through the Alps* is an undertaking of such general interest and importance, that a short notice of it will be acceptable.

The merit of proposing the plan which has been finally adopted is due to M. Médail, of Bardonnèche, who spent many years in examining this part of the Alpine chain, and lived long enough to see his project entertained by the commission appointed by the Sardinian Government to consider the feasibility of a railway tunnel which should pierce the Cottian Alps. No other line equally short has yet been proposed for a tunnel starting from so moderate an elevation. The N. terminus of the tunnel is on the slope of the

mountain, about 400 feet above the hamlet of Fournaux, on the high road of the Mont Cenis, $1\frac{1}{2}$ m. below Modane. The opening is 3,904 feet above the sea-level, and to reach it the railway will mount the valley as far as Modane, and then return by an incline of moderate slope. The entire distance to be pierced is about 12,500 metres, or $7\frac{3}{4}$ English miles. For one-half of the way—on the N. side of the centre—the railway will rise with an uniform slope of $\frac{23}{1000}$ to the height of 4,377 feet, and thence descend very slightly to the southern terminus, near to Bardonnèche, 4,344 feet above the sea. The main difficulty of this great enterprise lay in the fact that the height of the mountain above the tunnel made it impossible to give access to it by vertical shafts, which at the same time facilitate ventilation and multiply the points at which the work may be carried on. To overcome these two formidable objections it was necessary to devise machines which should provide more effectual means for ventilation than any hitherto in use, and at the same time penetrate the rock more rapidly than the ordinary process of blasting. When the matter was first seriously examined, it was estimated that, even if it were possible for workmen to labour in a shaft of such depth, and in air vitiated by the frequent explosion of gunpowder, it would have required thirty-six years to accomplish the work by such means as were then available. The demand for new machinery led to a supply of ingenious projects, of which three, proposed in turn by a Belgian, a Swiss, and an English engineer, were thought deserving of examination; but each was found defective in some essential respect, and it was by a skillful adaptation of the useful qualities of each of them that three Piedmontese engineers produced the machine which has been finally adopted. The motive power is derived from a waterfall about 65 feet in height, by which atmospheric air is compressed and made available in the interior of the tunnel at once for

ventilation, for piercing the rock, and for removing the rubbish. According to an official report recently presented to the Italian Parliament, it is estimated that the tunnel may be opened in 1875.

SECTION 7.

CENIS DISTRICT.

In this district we include that portion of the chain of the Cottian Alps, between the valleys of the Arc and the Dora Riparia, which adjoins the pass of Mont Cenis. On either side of the pass two peaks of considerable height, each flanked by extensive glaciers and snow-fields—the Roche Melon and the Mont d'Ambin—are the watch-towers of this portion of the rampart that should protect Italy from the greed of her northern neighbours. Though traversed daily by hundreds of travellers of every condition, the attractions of this district for the lover of nature have been scarcely at all recognised. The accommodation to be found on the plateau of the Mont Cenis, if not very good, is such as a mountaineer need not quarrel with; and the position is full of interest, not only to the naturalist, but also for those who like to enjoy at leisure the advantages of high mountain air, and of scenery which, though not of the very first order, will well reward the explorer. There is a good map of the immediate neighbourhood of the Mont Cenis by Dernien, published in 1821.

ROUTE A.

CHAMBÉRY TO TURIN—PASS OF MONT CENIS.

	Kilo- metres	English miles
Montmélian (by railway)	14	$8\frac{3}{4}$
St. Pierre d'Albigny	10	$6\frac{1}{2}$
Aiguebelle	12	$7\frac{1}{2}$
Épierre	10	$6\frac{1}{4}$
La Chambre	13	8
St. Jean de Maurienne	10	$6\frac{1}{2}$
St Michel	12	$7\frac{1}{2}$

	Kilo- metres	English miles
Modane (by road)	17	10½
Le Vernay	11	7
Lanslebourg	12	7½
Tavernettes	13	8
Molaret	14	8¾
Susa	10	6¼
<hr/>		
Bussolino (by railway) . .	8	5
Condove	14	8¾
Avigliana	7	4½
Alpignano	11	7
Turin	13	8
	<hr/>	<hr/>
	211	131¾

The distances on the railway lines are measured from the stations, which are often at some distance from the town or village after which they are named. The entire distance from Chambéry to Turin is now traversed twice daily in $15\frac{1}{4}$ hours. The trains take 2 hours 40 minutes to or from St. Michel, and there is a delay of from $\frac{1}{2}$ hour to 1 hour for loading and unloading the diligences, and for the custom-house visit at that place and at Susa. The luggage of travellers entering Italy is examined at Susa; those returning from Italy find the French douane at St. Michel.

On leaving Chambéry (§ 10), the rly. following a depression between the range of the Dent de Nivolet and the Mont Granier, makes a bend to the SE. until it meets the banks of the Isère at *Montmélian* (§ 10). Even when seen under the disadvantages of railway travelling, the scenery of this part of Savoy—where the rich vegetation of the valleys contrasts with the rugged precipices of the mountains that enclose them, and many a ruined stronghold recalls recollections of the continual warfare that was waged here for centuries—must interest the passing traveller. Above Montmélian the rly. crosses the Isère on a fine bridge, while the post road follows the opposite or rt. bank of the river. Mont Blanc is visible from some points of the road, which here bends to the NE. to the station of

St. Pierre d'Albigny. The little town is on the opposite side of the river, and is reached by omnibus in 25 min.

It is said to possess a good inn, and would be a convenient station for exploring the ranges which enclose this part of the valley of the Isère. (See § 10, Rte. 1.) About 3 m. SW. of the station is the village of *Coise*, very prettily situated, and reputed for its mineral waters, which contain iodine and bromine in combination with magnesia. Among other effects, they are said to act as a specific for the goitre, which is too common in this district.

$2\frac{1}{2}$ m. above St. Pierre is the station of *Chamousset*, close to the junction of the Arc with the Isère. The post-road to Albertville (§ 12) follows the latter stream, while the rly. and the road of the Mont Cenis are carried along the l. bank of the Arc. 5 m. farther is *Aiguebelle* (Inns: Poste; Parfaite Union), which was almost completely destroyed in 1760 by a land-slip from the Montagne des Combes. For the ensuing 20 miles the valley of the Arc mounts near due S., and the railway and high-road, after crossing the stream, keep together on the rt. bank. [From *Epierre*, two passes lead to La Rochette and Allevard. The *Col d'Herbarietan* descends on the W. side of the ridge, along an affluent of the Gelon torrent; while the *Col de la Perche*, farther S., leads to La Rochette by the valley of the Soudron (see § 10).]

At the hamlet of La Chapelle the rly. passes through a short tunnel, and on issuing from it the traveller may catch a glimpse to the SW. of two pyramidal peaks—the Pic du Frêne, and, more to the right, the Grand Miceau, with the pass of the Pas du Frêne between them (see § 8, Rte. F). [From St. Remy, on the l. bank, a path leads to Allevard, by the *Col de la Frèche*, more direct than those above mentioned.] About 14 m. from Aiguebelle is *La Chambre* (1,577'), a picturesque village, with some remains of ancient architecture. Up to this point the valley rises very gently—865 feet in 28 miles from Montmélian. Opposite to the village, the valley of the Glandon mounts rapidly to the SSW., leading by

various passes to Allevard, or to Bourg d'Oisans (see § 8). In exactly the opposite direction, the valley of the Bugion is traversed by the path leading to the Col de la Madeleine, NNE. of La Chambre (see § 11).

The Arc winds round the bases of the mountains that enclose the straitened valley before entering the little plain that lies at the confluence of the Arvan with the Arc, where stands the ancient capital of this district,

St. Jean de Maurienne (Inns: Europe; Cheval Blanc; Voyageurs; all indifferent). The little town (1,906') is on rising ground overlooking the valley, and about $1\frac{1}{4}$ m. distant from the railway station on the l. bank of the Arc. The *cathedral*, externally uninteresting, contains several curious monuments, and some magnificent specimens of wood-carving. Although the see is one of the oldest N. of the Alps, no part of the existing building appears to be older than the 15th century. The adjoining *cloisters* deserve a visit; and the church of *Notre Dame* has a curious porch dating from the 13th century. For passes from hence to the valley of the Romanche, see § 8. The Col de la Platière, leading to Moutiers, is noticed in § 11. The railway station was for several years the temporary terminus of the Victor Emmanuel Railway; but since the extension of the line to St. Michel the refreshment-rooms have been transferred to that place. After passing the torrent of the Arvan, the rly. enters the portion of the valley which has opposed the most serious difficulties to the maintenance of regular communication between the Mont Cenis and the capital of Savoy. The mountains which overhang the valley, and especially the Roc des Encombres, are composed of rocks that yield rapidly to the weather, and the slopes at their base consist of enormous piles of débris, accumulated in the course of ages. Every storm brings down fresh heaps of sand and fine rubbish, mixed with larger blocks; while at the same moment the swollen torrents eat into the half-consolidated soil of the

lower slopes, cutting deep trenches, and often sweeping large masses away in their current. The difficulty of finding solid foundations for bridges and embankments, or of protecting the road from frequent degradation, has been a constant source of anxiety and expense. $7\frac{1}{2}$ m. SE of St. Jean is the station of

St. Michel (2,316'?), the present terminus of the rly. Besides very tolerable food in the refreshment-room, which is warmed by stoves in cold weather, the railway company provide here and at Susa convenient dressing-rooms, where a traveller may enjoy the luxury of a wash on the way between Paris and Turin. The station is close to the village, where are several decent-looking inns (H. de La Poste, best, formerly H. de Londres). On the opposite side of the Arc is the opening of the Valmeinier, leading up to the Mont Tabor, and a little to the left the rugged path which leads by Valloires to the Col de Galibier (§ 6). To the N. is the track to the Col des Encombres (§ 11).

At St. Michel it is necessary to continue the journey to Susa by the high-road, unless the traveller be tempted to cross the chain which separates him from Piedmont by some of the passes described in the last or the present section. Should he intend to continue his journey by the diligences which correspond with the railway trains, he must present himself at a bureau where the names of travellers are taken down, and the places afterwards given in the order of priority. The coupé is very frequently secured beforehand in Paris or Turin, but, if not, a preference is given to applicants whose tickets show that they have made the longest journey. The diligences travel fast, and, including a halt of 20 min. at Lanslebourg, accomplish, in ordinary weather, the 48 m. from St. Michel to Susa, or *vice versâ*, in 9 hrs. In winter they are frequently delayed, and during snowstorms the travellers are occasionally detained one or more days at Lanslebourg. Post-carriages of various di-

mensions, to accommodate from 2 to 6 passengers, may be hired at St. Michel or Susa, and even secured beforehand at the central offices of the railway in Paris or Turin.

Soon after quitting St. Michel the road crosses to the left bank of the Arc, and begins to ascend towards the E. through a wild gorge, cutting almost perpendicularly the nearly vertical strata, in which beds of anthracite frequently recur. Larches begin to show themselves on the S. side of the valley; but on slopes exposed to the sun, on the opposite bank, the vine is cultivated as far as Freney. The road returns to the right bank below but out of sight of the village of *Orelle*, from whence a path leads to Moutiers by a high snow-pass, called *Col de la Montée du Fond*. It joins the path from the Col des Encombres (§ 11) near the hamlet of Bruyères.

Before reaching Freney (8 m. from St. Michel) the valley opens, and the ascent becomes more gentle; a little farther, above the hamlet of Fourneaux, where iron ore from a neighbouring mine was formerly smelted, the entrance to the great tunnel, and the workshops connected with it, come into view (see § 6, Rte. F). 1½ m. farther is

Modane (Inns: Lion d'Or; Des Voyageurs; Croix Blanche), a large village (3,494'), where the works for the railway and tunnel cause unusual movement. This is a convenient head-quarters for excursions. The Routes to Bardonnèche and Briançon are described in § 6; those to Pralognan in § 11.

Above Modane, the road, keeping to the l. bank, gradually rises to a great height above the Arc. The fortress of *L'Esseillon* is seen on a rock which appears to bar further progress, and the chasm through which the Arc flows between the forts and the high-road serves as a fosse to the seemingly impregnable works which formerly commanded this entrance into Italy. Under the treaty for the annexation of Savoy to France, the fortress is to be razed. On the slope of the mountain N. of

L'Esseillon is the village of *Aussois* (4,921'), leading to the Col of the same name (see § 11). In the opposite direction is the Col de Pelouze (Rte. D). After passing the fortress, the road descends towards the Arc, and 3 m. farther reaches *Le Vernay*, the principal hamlet of the commune of Bramaus, after crossing the torrent of St. Pierre, which descends from the Combe d'Ambin. About 4½ m. farther, on the rt. bank, is *Termignon* (Inns: Lion d'Or; Soleil; Rose), a small village, at the confluence of the Leysse with the Arc. From this point the higher peaks of the Tarentaise may most conveniently be approached by the track which leads over the Plan du Loup to Entre deux Eaux (§ 11). The little church which stands on a projecting rock above the village has a belfry of rather curious architecture, and the remains of an ancient chapel dedicated to St. Columbanus will also interest the antiquary. On leaving Termignon, the road makes a rather steep ascent and then gradually descends nearly to the level of the torrent. 3 m. farther, the road reaches the last considerable village in the valley of the Arc, 4,465 ft. above the sea.

Lanslebourg (Inns: H. de l'Europe; Hôtel Impérial has recently changed hands, and may not now be liable to the remarks made below. At this latter the diligences usually halt, both in going and returning, giving time to the passengers to obtain coffee or other refreshment). The most shameless extortion is here practised, especially in the case of travellers who are detained by snow-storms, which sometimes close the road in winter for one or two days. When snow lies on the ground, diligences and other carriages are conveyed across the pass on sledges.

Above the village the road crosses the Arc for the last time, and the ascent of the Mont Cenis almost immediately commences. The slope of the mountain is so uniform that on this side it presents no engineering difficulties, and when the existing road was constructed,

under the orders of Napoleon, between 1803 and 1810, it was merely necessary to decide what slope should be given to it. The gradient adopted was about 1 ft. in 15, and this is preserved with tolerable uniformity throughout the ascent. This is effected by six long zigzags, each bend of which is about $\frac{3}{4}$ m. in length. Twenty-three houses of refuge are placed along the road at convenient positions—a necessary precaution for the safety of those who are forced to pass during rough winter weather. But 5 of these are on the N. side, while 17 are disposed along the more exposed part of the route, between the summit and Susa. The refuge No. 18 is close to the top. To reach that point the diligences and post-carriages require about $2\frac{1}{2}$ hrs. from Lanslebourg, while a pedestrian, following the direct path which keeps near to the line of the telegraph posts, may accomplish the ascent in about two-thirds of that time.

The summit of the pass—6,772 ft. above the sea (some authorities make it 105 ft. higher)—does not command a very extensive view, the highest points visible being in the range of the Tarentaise Alps, N. of Lanslebourg. In the opposite direction the character of the scenery is very different. The mountain range between the valleys of the Arc and the Dora is here of considerable breadth, and while it descends directly from the summit of the pass to the Arc, it spreads out on the S. side into an undulating plain, on which lies a lake enclosed between peaks of moderate height; the real descent commencing at a distance of several miles from the top of the pass. In passing from Susa to Lanslebourg in winter time, when snow lies on the slope, it is possible to descend from the summit to the high road near Lanslebourg in about 10 min., by means of small sledges, used for the conveyance of wood, which the country people manage with great dexterity.

At about 2 miles from the top, on a sort of terrace, 200 ft. above the lake,

is *Les Tavernettes*. This consists of a row of buildings, of which the largest—the Ancienne Maison de Poste—now used merely as an inn, is one of the best head-quarters for a naturalist in the entire chain of the Alps. Easy of access—for it may be reached in an easy day's journey from Chambery, Milan, or Genoa—it lies in the centre of a district unusually interesting to the botanist. The pastures surrounding the lake, when seen before the cattle are driven up there, which usually happens early in July, may vie with our finest gardens for the beauty and variety of their flowers, and the surrounding heights produce most of the rarest species of the Western Alps. To name but a few of the more interesting species, we find here *Ranunculus pyrenæus*, *Draba pyrenaica*, *Arabis cenisia*, *Ononis cenisia*, *Phaca australis*, *Oxytropis fœtida* and *O. Gaudini*, *Astragalus depressus*, *Saxifraga diapiensioides*, *Hieracium valdepilosum*, *Campanula cenisia*, *Swertia perennis*, *Veronica Allionii*, *Pedicularis foliosa* and *P. gyroreflexa*, *Paradisialia Liliastrum*, *Carex microglochin*, and *Alopecurus Gerardi*. On the slope towards Lanslebourg may be found also *Pinus uncinata*, *Poa distichophylla*, and *Festuca flavesceus*. The list might be considerably extended if we were to include places within easy reach, such as the Little Mont Cenis and the Col du Clapier (Rte. C).

The Ancienne Poste has changed hands several times within the last few years, and the inn offers but moderate accommodation. It contains, however, several tolerable bed-rooms, and the food is generally pretty good. About 1 mile beyond Les Tavernettes is the Hospice of the Mont Cenis, a very large building, erected by Napoleon on the site of the ancient convent. One-half of the building was intended for barracks, now rarely occupied, built to accommodate detachments of troops, which, during the first empire, were constantly passing this way; the other half is under the charge of two ecclesiastics, who are bound to lodge and

feed poor travellers. There are two or three rooms fitted up for guests of the higher class, and a naturalist intending to make some stay might probably obtain here better accommodation than at the *Ancienne Poste*. 2 miles farther, and still on the plateau, is a group of houses with extensive stabling, called *La Grande Croix*, where some of the diligences change horses. [From hence the summit of the Roche Melon (Rte. B) is accessible by a long and laborious ascent over steep piles of débris.]

Immediately beyond *La Grande Croix* the plateau comes to an end, and the descent commences. The old road was carried to the right, along the steep rocks which overlook the little plain of St. Nicholas. This course was abandoned in consequence of the frequency of avalanches in spring, and a tunnel bored through the rocks at the most dangerous portion of the way has partly fallen in, so that even a pedestrian finds some difficulty in passing. The new road is carried by zigzags down a steep descent, near a fine waterfall of the *Cenise* torrent, the stream from the upper lake, and reaches the plateau of St. Nicholas out of the reach of avalanches.

The ancient horse-track, still sometimes used by foot-passengers, descended from the S. end of this plateau through the gorge of *La Ferrière* to the village of *Novalese*, at the base of the Roche Melon, and followed the stream from thence to Susa. No time is saved by taking that course, and for some miles farther it is better to follow the high road which is carried at a great height above *Novalese* along the W. side of the lateral valley which now opens into view. The Roche Melon, hitherto concealed by nearer peaks, now stands out, and remains the most conspicuous object throughout the descent to Susa. A gentle slope leads to Bard, and from thence, after some windings which may be abridged by a judicious choice of short cuts, to the post-house of *Molaret*. Less than $\frac{1}{2}$ m. below the post-house a rough path on the l.

leads down a steep slope, partly amidst brambles and deciduous trees, and reaches the bottom of the valley a short way from *Venaus*, from whence Susa is reached in less than 1 hour's walk.

This short cut might possibly enable passengers by the diligence ascending from Susa to reach *Molaret* before it had arrived there; but as the diligences travel fast, often at a trot where the ascent is not very steep, it is wiser to keep near to the carriage, and merely profit by the path which cuts off most of the zigzags on the road between *Molaret* and *Jaillon*, or *Giaglione*—a hamlet composed chiefly of cabarets half-way to Susa. The views of the valley of the Dora gained in the course of the descent are very fine, and the combination of Alpine scenery with southern vegetation should have conferred on this entrance into Italy a higher reputation than it has yet obtained. Some detached bosses of rock intervening between the *Cenise* and the Dora conceal the city from view until the traveller is close to

Susa (Inns: H. de France, perhaps the best, charges unreasonable; *La Poste*; H. de Savoie), a small city occupying the site of a Roman station, founded or extended in the time of Augustus. The cathedral, built in the twelfth century, has a curious belfry in the Romanesque style, and some of the carving and sculpture is interesting. A lane opening on the *place* of the cathedral leads in 2 or 3 min. to the Roman Triumphal Arch, erected about 8 B.C. in honour of Augustus. The columns are of the Corinthian order, and the capitals as well as the sculpture of the entablature are in a very decayed condition. Immediately N. of Susa are the ruins of the Fort of *La Brunetta*, blown up by the French in 1798. The adjoining rocks, and those above the neighbouring village of *Mompantero*, exposed to the full force of the sun, support many southern plants, which are rarely seen so far from the shores of the Mediterranean. Here also is found

a curious species very rare in Italy—the *Telephium Imperati*.

The trains between Susa and Turin travel very slowly, the ordinary trains employing nearly 2 hrs., and the so-called express, 1 hr. 20 min., to accomplish 33 miles. For about three-fourths of the distance the railroad is carried through the valley of the Dora, enclosed between two mountain ranges which gradually diminish in height and subside into the plain near *Alpignano*. On the way, at about 14 m. from Susa, near to the *Condove* station, is seen a remarkable rock rising nearly 2,000 ft. above the valley, and crowned by the ancient castle-like convent of San Michele, founded in 999, and rebuilt by the late King Charles Albert. After passing within sight of Rivoli the train reaches

Turin (Inns : Europa, kept by Trombetta, first-rate ; Liguria, in the Via di Porta Nuova, near the railway to Milan and Genoa, good, with an excellent restaurant on the ground-floor ; Gran Bretagna ; Feder, formerly good, much fallen off ; H. de la Ville, formerly Pension Suisse, rather cheaper than the above-mentioned.) Being now the capital of a great state, and largely increased in population, Turin is an expensive city. It abounds in handsome *cafés*, and in restaurants. Though prices *à la carte* are not cheap, a party dining together can get a good dinner at from 3 to 4 fr. a head, at the better class of restaurants.

ROUTE B.

SUSA TO BESSANS—ROCHE MELON.

To a mountaineer the most interesting object in the neighbourhood of Susa is the peak of the Roche Melon. There is perhaps no point in the range of the Alps so well placed to command a view of the undulating plateau between the Alp and the Apennine, scored by the channels of many rapid rivers, that

makes up the territory of Piedmont. The Monte Viso, though higher, is farther from the centre, and more surrounded by other high peaks. By the Rte. here described it is possible to take the summit of the Roche Melon on the way to the village of Bessans in the valley of the Arc ; but this involves a very laborious day's work, and most persons would find it more advisable to descend from the summit to the Grande Croix on the road of the Mont Cenis ; thus securing accommodation for the night at the Ancienne Poste or at Lanslebourg.

The most direct way from Susa is by the village of Mompantero, from whence a horse-track mounts to the chalets of Trucco. The ascent continues with increasing steepness past the highest larches, and finally reaches a chapel called Cà d'Asti, near which, at the extraordinary height of 9,386 ft., are some sheds for the reception of pilgrims. Above 5½ hrs. are required to reach this point, but in descending the distance may be accomplished in less than 3 hrs. From the Cà d'Asti the way lies partly along a narrow ridge of rock, and partly up extremely steep slopes of débris. 1¼ hr. are required to reach the summit over ground which elsewhere in the Alps would be considered fit only for the chamois hunter or the professed mountaineer ; yet it is annually traversed by some hundreds of pilgrims, men and women, who commonly pass the night on the mountain in order to reach the top at an early hour on August 15. The object which prompts the pilgrims to face the dangers of the ascent—for serious accidents are not unfrequent—is an ancient chapel, originally built by a crusader, Boniface of Asti, in fulfilment of a vow made when a captive among the Saracens. It is so small that but four persons can enter it at a time, and it is difficult to understand how the large number of visitors can find footing on the narrow ridge which forms the summit of the mountain. It is said that the original chapel of Boniface of Asti was

hewn out of the rock in a spot which is now covered up with *névé*. The existence of a recess artificially hollowed in the rock was proved in the hot summer of 1820, when the entrance was uncovered by the melting of the snow, and the supposed chapel was entered by M. Francesetti. Beside the chapel, on the highest peak of the mountain 11,621 ft. above the sea, is the stone signal erected by the engineers for the measurement of an Arc of the mean parallel from the Adriatic to the Atlantic coast of France. The extreme steepness of the S. and W. faces of the Roche Melon enables so little snow to rest there that in summer they are usually quite bare; but on the northern slope a considerable field of *névé* extends from the summit, and gives rise to a glacier which descends through the head of the Vallon de Ribons towards Bessans.

By the way here described, from 7 to $7\frac{1}{2}$ hrs., exclusive of halts, are required to reach the summit from Susa. A rather longer, and somewhat less steep, track is by *Novalese*, on the old road of the Mont Cenis, a little more than 1 hr. from Susa, close to the junction of three torrents—the Cenise, the Marderal, and the Clare. The latter forms a very fine cascade, more than 600 ft. high, near the village. The ascent is by a very stony path to the *châlets* of Traverse, and from thence to the Cà d'Asti, where it joins the first route; or it is possible to ascend in a nearly direct line to the top by the SW. face of the peak. This latter way, lying for a long distance over yielding *débris*, is better fitted for the descent than the ascent, and then only for a practised mountaineer.

A third way to the summit on the side of Piedmont is from the Grande Croix. The ascent from thence winds along the steep slopes of the intervening range, for the most part over crumbling slates, passing under the range of precipitous rocks that lead up to the peak. Should the traveller desire to reach the valley of the Arc direct from the summit, he must descend towards

the NNW., and traverse the glacier of Roche Melon for some distance, bearing to the rt. towards the lateral moraine, which must be followed when the ice becomes too much crevassed. If unprovided with a rope, it is advisable to reach as soon as possible the rt. bank of the glacier. The glacier comes to an end in a narrow basin called *Entre les Têtes*, lying between two rounded summits called the *Grosse Tête* and the *Petite Tête*, and there arises the torrent of *Ribons*. The gorge through which the torrent descends is wild and striking, especially in the upper part. In the course of the descent the track passes by many *châlets*, and after $4\frac{1}{2}$ hrs. walk from the summit reaches the village of *Bessans*, where there is a very poor yet dear inn, about $2\frac{1}{2}$ hrs. walk from Lanslebourg.

In fine weather a guide may not be absolutely necessary for a practised mountaineer who would ascend the Roche Melon from Susa, but local knowledge is requisite for the descent from the summit to Bessans.

ROUTE C.

BRAMANS TO SUSA, BY THE COL DU CLAPIER. PETIT MONT CENIS.

This is a very interesting day's walk of about $9\frac{1}{2}$ hrs., exclusive of halts. By means of the pass of the Petit Mont Cenis this route is easily combined with that of the Mont Cenis (Rte. A). Thus an active walker may take all the three passes in a long day's walk from Lanslebourg to Susa, or he may go from Bramans to Susa by the Petit Mont Cenis, avoiding both the Mont Cenis and the Col du Clapier.

Close to Bramans, in the valley of the Arc (Rte. A), is the junction of the torrent of St. Pierre, and a char-road carried up the l. bank of that stream is the way to the Col du Clapier. The rocks which enclose the valley are easily disintegrated, and they have

been extensively cut through or undermined by the stream. This is particularly well seen about $1\frac{1}{4}$ hr. above Bramans, where the road passes near the church of St. Pierre, over a ridge which commands a view of the Col de Chavière and the adjoining peaks (§ 11), with the valley of Arc to St. Jean de Maurienne. This ridge formerly barred the valley, and thus formed a considerable lake; but it has been sawn through by the torrent to the depth of 260 ft. below the former level of the lake. After passing the tributary torrent of Etiaches, the char-road comes to an end at the hamlet of *Planay*, $\frac{1}{4}$ hr. farther, about 2 hrs. from Bramans. The ascent continues by a rough track, which passes by some scattered larches, and then over stony pastures covered with huge scattered blocks, till it reaches the base of a massive ridge, which seems to form the E. extremity of the valley. Two paths mount the steep slopes of this ridge: that to the L., which is the more laborious of the two, leads nearly due E. to the pass of the Petit Mont Cenis (7,300'). This is a depression in the chain separating the nearly parallel valleys, through which the road of the Mont Cenis and the present route are carried. There is this difference—that on the Cenis pass the summit level is on the slope above the valley of the Arc, and a long descent leads from thence to Susa; whereas the valley of St. Pierre mounts gradually from the valley of the Arc to the Col du Clapier, from whence there is an abrupt descent on the S. side towards Italy. Thus it happens that the range, which separates the St. Pierre from the Cenise, forms part of the dividing chain of the Alps, and the Petit Mont Cenis is one of the passes over that chain. At least 2 hrs. are required for the ascent from Planay, and rather less time suffices to descend from the Petit Mont Cenis by an easy path to Les Tavernettes on the high road of the Mont Cenis, passing by the N. end of the lake. (See Rte. A).

The pass of the Petit Mont Cenis is but little used, as it is more laborious than the main pass, and less direct for a traveller bound from Modane to Susa than the Col du Clapier. It derives some special interest, however, from the recent investigations, which make it most probable that it was the pass by which Hannibal entered Italy, and some travellers may be induced to follow it for the sake of comparing the ground with the details given by Polybius. The editor is much indebted to the Rev. T. G. Bonney, of St. John's College, Cambridge, for the following summary of the arguments which seem to establish this as Hannibal's Route, deduced from the writings of the Rev. Robert Ellis, of the same university, with references to the chief authorities, and to the writings of those who have upheld opposite conclusions.

The most condensed form for presenting the arguments of Mr. Ellis is to state the conditions which must be fulfilled by any route over the Alps which claims to be that of Hannibal, as deduced from the narrative of Polybius, and to compare the facts in regard to the Little Mont Cenis

I. The commencement of the ascent of the Alps must be about 100 Roman miles from the junction of the Rhone and the Isère, reckoned along the left bank of the latter river.

From Valence to Le Cheylas is $87\frac{1}{2}$ Roman miles.

II. The length of the route over the Alps, beginning at the commencement of the ascent of the mountains, and terminating at the commencement of the plains of Italy, must be about 150 Roman miles.

From Le Cheylas to Avigliana is $132\frac{1}{2}$ Roman miles.

N.B. Polybius' distances are given in stadia, and therefore ought to exceed the true distance slightly. Stadia are generally, in other places, found to be too great.

III. At the commencement of the ascent of the Alps a defile must be found, the character of which, and of

the surrounding country, is in accordance with the events related by Polybius to have occurred in that place.

The minor conditions this includes may be thus given:—

(1.) The defile must be commanded by certain heights of considerable elevation;

(2.) which must not be easily accessible from below the defile.

(3.) The way through the defile must skirt, in some places, the edge of a precipice.

(4.) Immediately below the defile must be found a place where Hannibal's army could encamp;

(5.) which must be visible from the heights commanding the defile.

(6.) Above the defile, and near it, must be found an open district where a town stands, or might have stood, and where Hannibal's army might have encamped.

The gorge of Le Fay, between Goncelin and Pontcharra, in the valley of the Isère, answers these conditions.

(1.) It is commanded by the heights of Brame Farine;

(2.) which are not easy of access from Le Cheylas.

(3.) The footpath from Le Cheylas through the gorge of Le Fay skirts the precipice for about $\frac{1}{2}$ a mile.

(4.) Between Le Cheylas and Goncelin Hannibal might have encamped.

(5.) From these heights a large part of the country between Le Cheylas and Goncelin is visible, and part of the Graisivaudan.

(6.) The valley of the Isère opens near the junction of the Bréda, where the town of Pontcharra now stands.

IV. At a place nearly half-way between the town of the Allobroges and the summit of the pass 'a strong white rock' must be found, and the adjacent country must correspond with the account of the events which took place near that rock.

St. Jean de Maurienne is half-way in point of distance, but not quite in time: the rock must be near St. Jean, or a little above it; such is the rock of Baune,

about 6 or 7 miles above St. Jean, which will suit Polybius' account in every respect.

V. A place suitable for the encampment of Hannibal's army must be found at the summit of the pass.

The plateau of the Little Mont Cenis meets this requirement.

VI. From a point probably not far from the road over the summit of the pass, but yet not on the ground where the Carthaginians would encamp when they first reached the summit, the plains of the Po, and in all probability the Apennines also, ought to be visible.

Between the plateau of the Little Mont Cenis and La Grande Croix, a ridge can be gained by a few minutes' walk, whence is seen the country to the east of the Po, and the south of the Tanaro, as far as the Apennines. This ridge is about $\frac{1}{2}$ a mile long without any definite head, so that many hundreds might have been collected on it.

VII. The commencement of the plains of Italy must be less than three days' march from the summit of the pass.

It is 39 Roman miles, which, for a tired army, would be between 2 and 3 days' march.

VIII. The final part of the descent must be very steep.

Between La Grande Croix and La Novales there is a descent of more than 3,600 ft. in 6 miles.

IX. At a place within half a day's march from the summit of the pass, the path must lie along a precipitous mountain side, liable to be broken up for a space of 300 yards, and otherwise corresponding with Polybius.

Between La Ferrière and La Novales, on the old road, there is such a place, distant about 4 English miles from La Grande Croix.

X. The plains into which the road over the pass enters must have been inhabited by the Taurini.

Avigliana is generally identified with Ad fines, the boundary between the district of the Taurini and the Cottian tribe of the Segusiani.

The passes which have at different

times been claimed as Hannibal's route are—Great St. Bernard, Little St. Bernard, Mont Cenis, Mont Genève, Col de la Seigne, and Col de la Traversette.

The distance from the summit of the	
Great St. Bernard to plains	. 61
„ Little St. Bernard	. 82
„ Mont Cenis	. 39
„ Mont Genève	. 53

The actual distance probably did not exceed 40. Hence, the Little St. Bernard will not do. From it the plains of Italy cannot be seen, not even the Val d'Aosta; there is a fine view of the range of Mont Blanc, which would be no cheerful prospect to Hannibal's soldiers; the Val d'Aosta lies in the wrong direction, and if Hannibal had pointed to the right, he would either have pointed to the road they had come by, or right into the Graian chain. The Libui, a tribe known to Polybius, not the Taurini, inhabited the country into which Hannibal would have entered had he gone by the Val d'Aosta, the exit from which, in former days, could not have been very easy.

The gorge of La Thuile is too low to answer to Polybius' account, the village of La Thuile itself being not more than 4,700 ft. above the sea, and the gorge being below it. The Rocher blanc, below St. Germain, is an insignificant thing, and an army could have gone up the opposite bank, by way of the present mule road, without much difficulty.

The latest publications on this subject are—

A Treatise on Hannibal's Passage of the Alps, in which his Route is traced over the Little Mont Cenis. By Robert Ellis, B.D. Cambridge, Deighton, 1854.

A Criticism of Mr. Ellis's new theory concerning the Route of Hannibal, with some Remarks on the Hypothesis of M. Replat. By William John Law. Upham and Beet, 46 New Bond Street, 1855.

Mr. Ellis's Observations on Mr. Law's Criticism. Journal of Classical and Sacred Philology, No. vi.

Mr. Law's Reply. Upham and Beet, 1856.

Mr. Ellis's Further Observations. Journal of Classical and Sacred Philology, No. vii.

Reply to the second part of Mr. Ellis's Defence. By Mr. Law. Upham and Beet, 1856.

Other works on the subject are—Deluc, Histoire du Passage des Alpes. Dissertation on the Passage of Hannibal, by a Member of the University of Oxford. Vide also Ukest, Geographie der Griechen und Römer. Dr. Arnold's History of Rome, volume iii. King's Italian Valleys of the Alps, ch. iii. History of Piedmont, by Antonio Galenga, vol. i. ch. ii.

The original accounts are—Polybius, bk. iii. ch. 49—60. Livy, bk. xxi. ch. 32—38.

In going from Bramans to the Col du Clapier the ascent is not so steep as that to the Petit Mont Cenis, and in 1½ hr. from Planay the traveller mounts the ridge which separates the upper portion of the valley, or *Combe d'Ambin*, from the lower part, or Vallon de St. Pierre. It is the opinion of some geologists that the ridge in question once extended continuously across the valley so as to form great lakes, which filled the greater part of the Combe d'Ambin and the lateral valley leading to the Col de Galambre (Rte. D), and that this massive barrier has been gradually eaten away by the torrents, until the lakes were drained or filled up with débris. The scenery of the Combe d'Ambin is singular. The valley itself is a trough formed between the Mont d'Ambin and the Cime du Bard, very uniform in shape, the bottom showing a wide expanse of green pastures, and the sides a succession of stony slopes; but the upper part of the Mont d'Ambin, whenever it shows its ranges of dark crags surmounted by streaming glaciers, suffices to give sublimity to the scene.

About ½ m. beyond the summit of the steep ascent before mentioned are the chalets called *Grandes Savines*, where the track leading from the Petit Mont Cenis to the Col du Clapier joins our Rte. E. of some steep rocks, on

a high shelf of the Cime du Bard, are several small lakes, of which the largest is the Lac Blanc. From the châteaux to the Col the way does not present the slightest difficulty; the ascent is very gentle until, after about 1 hr., a somewhat more rapid rise leads to the highest plateau, occupied by a small lake—the *Lac des Savines*—whose dimensions vary according to the season. $\frac{1}{4}$ hr. farther, 5 hrs. from Bramans, is the summit of the *Col du Clapier* (8,107'), sometimes called Col de Clairée. From the Col a track, scarcely visible along the steep rocks, leads by the W. side of the valley of the Clairée to the *Col de Touilles*, a depression in the ridge which divides the Clairée from the Dora, over which a path descends direct to Exilles (§ 6, Rte. A). By that difficult, and even dangerous, way the Vaudois passed in the course of their surprising march under Henri Arnaud, and on the following day gained a signal victory at Salabertrand.

The descent from the Col towards Susa commences through a narrow glen confined between the precipitous rocks of the Cime du Bard, on the l., and steep rocky slopes on the rt., overhung by a portion of the so-called Glaciers Penibles, forming the E. declivity of the Mont d'Ambin. In $\frac{1}{2}$ hr. the traveller reaches a little rocky basin, traversed by the stream which, lower down, forms the Clairée. The view from this point is extremely interesting. From the verge of the precipitous rocks that fall away immediately below him, the traveller sees the valley of the Clairée, more than 3,000 ft. beneath his feet; to the rt. is the rugged mountain of Touilles, traversed by the pass already referred to, and beyond it the ranges that enclose the valley of the Dora Riparia; while on the l., above some very steep rocks, are seen the remains of an ancient fort. It is not at first easy to guess how the descent is to be effected, but a practised cragsman will soon detect the ledges and gullies by which he may accomplish his object without any real difficulty. The first and steepest part

of the way is by a sort of chimney in the face of rocks of calcareous schist, where the botanist will observe with interest, *Brassica Richeri*, *Saponaria lutea*, and other rare species. On a little terrace half-way down the rocks is a hut, perched in a position where no domestic animals, save goats, can move without difficulty. After descending in this way for $1\frac{1}{2}$ hr. (2 hrs. from the top), the track quits the rocks, and crosses to the l. bank of an affluent of the Clairée, close to a group of huts called Molarin. A short distance farther down the valley another group of hamlets is passed on the opposite or rt. bank of the Clairée. The direct way to Susa here leaves the banks of the stream to follow a watercourse, which is destined to irrigate the slopes about Jaillon, on the road of the Mont Cenis. The path lies along the bank or sustaining wall of this watercourse, which in some places is carried along the face of seemingly vertical rocks. Even in places where the rock is partly hollowed to form a channel for the water, there is no real difficulty in passing; but the route should not be undertaken by persons with weak or uncertain heads. The passage of the watercourse lasts nearly 1 hr., and beyond it the path joins the high road of the Mont Cenis a few min. above Jaillon (Rte. A), $3\frac{1}{2}$ hrs. from the Col du Clapier, and 1 hr. from Susa.

In taking this Rte. from Tavernettes, on the plateau of the Mont Cenis, the mountaineer may avoid the rather monotonous W. slope of the Petit Mont Cenis, by ascending the N. side of the Cime du Bard to the group of lakes which lie SE. from the châteaux of Savines, joining the above-described Rte. about the Lac des Savines. A guide would be absolutely necessary.

The way from Bramans to Susa may be varied by climbing the slopes E. of the Lac des Savines to the crest of the ridge dividing the Clairée from the Cenise (9,497'), and then descending along the ridge to the Cenis road above Jaillon. This route commands fine

views of the Roche Melon and the Combe de Susa.'—[W. M.]

ROUTE D.

BRAMANS TO EXILLES—COL DE GALAMBRE—MONT D'AMBIN.

The glaciers of the Mont d'Ambin are reputed in the Maurienne to be unusually difficult and dangerous, yet they have not hitherto attracted the attention of the members of the Alpine Club. The *Mont d'Ambin* has hitherto been ascended only from the W. side, and is approached by the same track which leads to the Col de Galambre. This mounts from Planay (see last Rte.) on the l. bank of the torrent of St. Pierre, and follows the lateral valley which descends immediately opposite to the Petit Mont Cenis. After passing the Baraque d'Ambin, the path comes to an end at the head of the valley, in a wild amphitheatre of rock and glacier. From thence a long and steep ascent to the E. finally leads to the ridge of the mountain, which is followed towards the NE. to the highest point (11,092'). The officers who erected the signal which still remains there describe the final climb as 'very perilous.' 8 hrs. walk from Bramans to the summit.

Should the traveller wish to reach Exilles by the *Col de Galambre* (10,200'), he should follow a direction over the glacier nearly due S. from the Baraque d'Ambin, and will descend from the top to Exilles by the châteaux of Véraire. [Farther information is desired.]

ROUTE E.

BRAMANS TO BARDONNÈCHE, BY ROCHE-MOLLE.

Three passes, all of them little frequented, lead from Bramans in the valley

of the Arc to Bardonnèche, by the *Vallon de Rochemolle*, one of the four glens which meet at that place.

1. *By the Col de Pelouze*.—The high road to Modane is followed for about $3\frac{1}{2}$ m. to the opening of the valley of Sainte Anne, near the Fort of l'Esseillon. The track to the Col mounts through this valley, dark with pine forests. Before reaching the hamlet of *Bauges* a stream is crossed, which descends from some considerable glaciers to the SE. The highest châteaux bear the significant name of *Avalanche*. In 5 hrs. the *Col de Pelouze* is attained. The descent to Rochemolle is comparatively short, but extremely steep. On reaching the bottom of the valley the track keeps to the rt. bank of the torrent, and in 1 hr. from the Col reaches *Rochemolle*. 2 hrs. farther, either by the rt. or l. bank, is Bardonnèche (§ 6, Rte. F), 8 hrs. walk from Bramans or from Modane by this Rte.

2. *By the Col d'Etiaches*.—This way, although difficult, is occasionally passed by mules in the height of summer. Just before reaching the hamlet of Planay (Rte. C), the Val d'Etiaches opens on the rt. hand. $2\frac{1}{2}$ hrs. (or perhaps more?) are required to reach the summit of the Col (9,301'), and the same time is occupied in the very rapid descent to Rochemolle. At least 8 hrs., exclusive of halts, should be allowed for this way from Bramans to Bardonnèche.

3. *By the Col d'Ambin*.—This is a hunter's pass, said to be difficult and dangerous; to reach Bardonnèche on the same day it would be advisable to sleep at Planay or at the châteaux of Grandes Savines. From the Baraque d'Ambin (see last Rte.) the ascent lies to the SW., over the glaciers which enclose the head of the valley. After passing the ridge the way turns to the NW., following the torrent which traverses the head of the Vallon de Rochemolle, and joins the track from the Col d'Etiaches where that valley again turns to the SW.

Information as to all the above passes is desired.

CHAPTER III.

DAUPHINE ALPS.

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THE extensive mountain region which lies between the Cottian Alps and the valley of the Rhone occupies nearly the entire of the ancient French province of Dauphiné, whose limits correspond to the three modern departments of Drôme, Isère, and Hautes Alpes. The first and most westerly of these, lying between the Rhone and the Drac, is traversed by mountain ranges, chiefly calcareous, of which but two or three summits exceed 7,000 feet in height. Rarely visited by tourists, it is said to contain much picturesque and pleasing scenery, but not sufficiently Alpine in character to fall within the scope of this work. The higher mountains, or Alps of Dauphiné, are included within the two departments of Isère and Hautes Alpes. As stated in the intro-

duction to the last chapter, they are separated from the dividing range of the Cottian Alps by the valley of the Durance and its tributary the Guisanne, which rises in the range W. of the Mont Tabor. The entire mass is deeply cut by the valley of the Romanche, through which the great road is carried from Grenoble to Briançon, and thence into Italy, crossing from the valley of the Romanche to that of the Durance by a comparatively low pass — the Col du Lautaret.

Of the two Alpine groups thus formed, the loftiest and most extensive is that lying to the S. of the Romanche, which we shall call, from its best known, though not its highest, peak, the Pelvoux district. No part of the Alps is so nearly isolated as this huge mass; for

excepting the above-mentioned ridge of the Col de Lautaret, it is completely enclosed on the S., E., and N., by the valleys of the Durance and the Romanche, and on the W. by that of the Drac, connected with the Durance by the almost level depression through which the high road from Grenoble is carried to Gap, and thence to Sisteron.

The Alpine range lying N. of the Romanche has some apparent connexion with the Cottian Alps described in the last chapter. It is, in fact, one of the three considerable ridges which diverge from the Mont Tabor; and lying as it does between the valleys of the Arc and the Romanche, it formed the frontier line between France and Savoy until the recent annexation of the latter province. As the two streams above-named both fall into the Isère, the latter river forms the natural boundary of this district to the westward. There is no well-known name by which the range here defined can conveniently be designated. As the greater part of the district which properly belongs to Dauphiné is known as the *Pays d'Oisans*, while the Savoy portion forms but a small part of the district of Maurienne, it appears most convenient to call this the Oisans district. It is true that M. Elie de Beaumont and other writers have applied the name *Montagnes de l'Oisans* to the entire group of the High Alps of Dauphiné; but this name is objectionable, and has not been generally adopted: for in truth none but a very small portion of the Pelvoux district, as defined in this work, was ever included in the territory which obtained the name of Oisans from the tribe of the Uteni, found by the Romans in occupation of the valley of the Romanche, and which retained its independence after the rest of Dauphiné had been united to the Crown of France.

No portion of the Alps, and perhaps no part of Europe, is so ill-provided as Dauphiné with all that is required for the comfort of travellers. The inns, with very few exceptions, are repulsive

to an unusual degree, food is bad and hard to procure, and the habits of the people are filthy beyond example. As a general rule, each description of insect that is known to plague the human race in these latitudes is sure to be found in every dwelling. The natural consequence has been, that while tourists and travellers from every country visit the Alps for exercise and enjoyment, the French Alps remain almost unknown. With all this, the natural attractions of the country are of a high order. Looking to the height of the principal peaks, and the grandeur of the rock and glacier scenery, Dauphiné ranks next after the Pennine and Bernese Alps, and some of the higher valleys are scarcely anywhere to be matched for wild and savage sublimity. Only within the last few years some daylight has begun to break through the obscurity in which this region has been involved; for although M. Elie de Beaumont and other French men of science have visited the country, and in 1841 Professor Forbes explored some of the high glacier passes in the neighbourhood of the Mont Pelvoux, while a few other Englishmen have occasionally traversed some portion of the district, the absence of a correct map made it impossible to combine together their partial observations so as to form consistent and accurate conclusions. During the interval, however, the engineers engaged in the general survey of France have laboured assiduously in this region. They have reached many of the higher peaks, and have nearly completed the triangulation of the entire country. The sheets of the general map, which will contain the results of their labours, are so far advanced that in five or six years they may probably be given to the public. In the meantime the best, and almost the only, general map of Dauphiné is that of General Bourcet, now more than 100 years old, having been first published in 1760. Several French writers have lately published accounts of mountain excursions in this district,

and the first part of a detailed Guide to Dauphiné, by M. Joanne, has very lately appeared [1862], soon to be followed by the second part, which will include the higher mountains. These works contain a great deal of new and apparently accurate information respecting the more easily accessible portions of the group; but it is to the members of the Alpine Club that the public is mainly indebted for a correct knowledge of that vast mass of snow-covered peaks which have been vaguely designated under the collective name of Mont Pelvoux. Several interesting papers upon this district have appeared in the second volume of the Second Series of 'Peaks, Passes, and Glaciers,' but it is chiefly with the assistance of Mr. F. F. Tuckett, who is equally well known as an excellent mountaineer and a diligent and accurate observer, that the editor is enabled to complete his account of this group, and to correct the errors of all, even the latest, writers who have preceded him. Mr. Tuckett has been favoured with the unpublished results of the French survey so far as this has yet advanced, and these, along with his own observations, have been kindly placed by him at the editor's disposal.

Those who may be willing to explore this region are strongly advised to depend as little as possible upon the resources of the country. A sleeping-bag will enable them to escape the most grievous of the plagues that afflict ordinary travellers. Neither spiked poles, serviceable ice-axes, nor trustworthy ropes, are to be found; and as supplies are often deficient, a moderate provision of tea, chocolate, portable soup, or other convenient luxuries, will be sure to turn to account. To explore the upper region, or attempt the ascent of the higher peaks, a traveller will do well to engage the assistance of at least one first-rate Chamouni or Swiss guide. Among the native guides are a few good cragsmen, but scarcely one who is qualified to cope with the difficulties of glacier travelling.

SECTION 8.

OISANS DISTRICT — VALLEY OF THE ROMANCHE.

ONE of the two streams whose union at Briançon forms the Durance — the Guisanne — flowing in a direct line from the NW., leads directly to the Col du Galibier (§ 7), which is generally taken as the limit between the Cottian Alps and the northern range of the Dauphiné Alps. It may be doubted whether the mountain ranges lying to the W. of that limit, and forming the watershed between the Arc and the Romanche, should be described as a single chain, or as a succession of three comparatively short ridges transverse to the direction of the main valleys, and approaching to that of the meridian. The highest of these partly separate groups lies immediately N. of La Grave en Oisans. It includes several lofty peaks, especially one double — or triple-headed summit, which is known as *Aiguille d'Arve*, or *Trois Elions*, said to be 11,519 ft. in height, and the *Pic de Goleon* (11,250'). This group is very imperfectly known, and deserves the attention of mountaineers.

Between this and the group of the *Grandes Rousses* is a depression in the range over which lie several passes which are noticed in the following pages. The *Grandes Rousses* form a more continuous mass than that just referred to, and are, like it, directed from N. to S. The highest peak — *L'Etendart* — has been determined by M. Héricart de Thury at 11,906', probably too high. This group has been visited by several French geologists; and an account of its geological relations, with a map and several rude sketches, has been given by M. Dausse in the second volume of the *Mémoires de la Société Géologique de France*. It is not known that the higher peaks of this, or the preceding group, have yet been ascended.

W. of the *Grandes Rousses*, and separated from them by the valley of the

Olle, and by the passes leading from thence into Savoy, is a less lofty, but much longer, ridge, extending parallel to the course of the Isère from Vizille nearly to Aiguebelle, a distance of more than 30 miles, and its influence on the direction of the valleys is seen in the bend which the Arc makes to the N., and the Romanche to the S., before they respectively join the Isère. This range includes several lofty summits, of which the most conspicuous are the Pic de Belledonne (about 9,810'), near Grenoble, and the Pic du Frêne (9,203'), W. of Allevard. The passes over the main chain between the Oisans district and the valley of the Arc are little frequented; and a traveller willing to undertake excursions less laborious than the great glacier passes of the Pelvoux might usefully undertake to explore the less formidable group which lies N. of the village of La Grave, or else that of the Grandes Rousses.

ROUTE A.

BRIANÇON TO GRENOBLE—COL DU LAUTARET.

	Kilo- mètres	English miles
Monestier . . .	14	8 $\frac{1}{2}$
Col du Lautaret . .	10	6 $\frac{1}{2}$
La Grave en Oisans .	10	6 $\frac{1}{2}$
Le Dauphin . . .	14	8 $\frac{1}{2}$
Bourg d'Oisans . .	16	10
Rioupéroux . . .	16	10
Vizille . . .	16	10
Grenoble . . .	17	10 $\frac{1}{2}$
	<hr/> 113	<hr/> 70 $\frac{1}{2}$

The new imperial road is traversed by courier every night, and in summer also by diligence from Briançon to Grenoble. Distances between Bourg d'Oisans and Briançon may require correction since the completion of the new road.

As mentioned in the preceding chapter, the upper valley of the Durance is reached from the side of Piedmont by lower and easier passes than any which traverse the main chain of the Alps be-

tween the Tyrol and the Mediterranean. This, however, has not much availed to facilitate communication between Italy and the N. or centre of France. To reach Grenoble or Lyons from Briançon, it was necessary either to cross the range of the Dauphiné Alps intervening between the Durance and the Isère, or to make a long circuit by Gap and the valley of the Drac, involving a detour of at least 50 miles. The only point at which it appeared practicable to carry a carriage road over the Dauphiné Alps was by the Col du Lautaret, which, although the lowest in that group, is considerably higher than the Mont Genève, and is approached on the W. side by the valley of the Romanche, beset with formidable obstacles to the construction of a road. After more than half a century of alternate activity and neglect, the new imperial road, commenced by the first Napoleon, was completed in 1861, and may vie with the most celebrated Alpine passes in point of wild and striking scenery visible from the road, and for the remarkable engineering works by which the difficulties of the undertaking have been surmounted.

For travellers who may take this route from Turin to Grenoble with post horses, the best stopping-place between the latter town and Susa is at the Baths of Monestier, when these do not happen to be overcrowded in the bathing season. The road is sufficiently interesting to reward a pedestrian, excepting the portion between Grenoble and Rioupéroux.

Leaving Briançon, the high road is carried for several miles, in a very direct line along the left bank of the Guisanne. In ascending the valley, which is populous and tolerably fertile—unlike the usual character of Dauphiné scenery—there is no striking object in view; but when the route is made in the opposite direction, the views of the little city of Briançon, crowned by its formidable forts, and sometimes backed by the distant peak of Monte Viso, are extremely striking. At a height of 4,898 feet, still surrounded by barley-fields and fruit-trees, stands

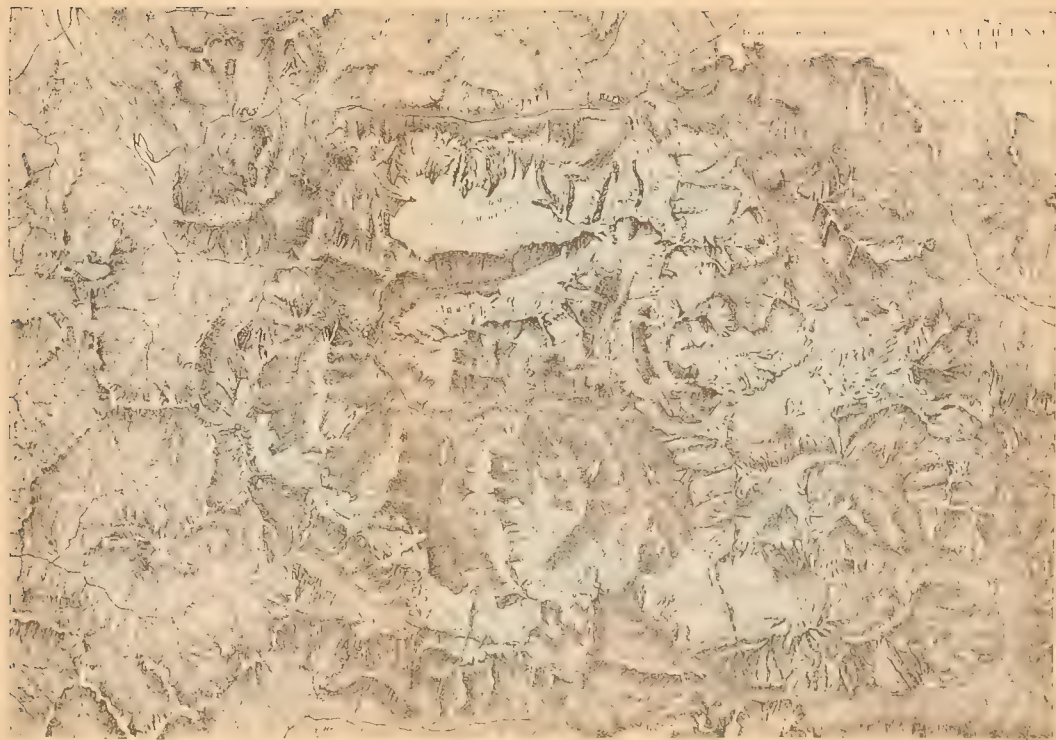
la Part ou les Trois Evêchés (Pic)

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Monestier (several inns open during the bathing season; best chez Armand, very good for Dauphiné), a large village, frequented in summer on account of the mineral waters, which are used internally, and for baths.

W. of Monestier, but not visible from the valley, is a very lofty range, extending from the Crête de Dourmillouse (12,008') to the Col du Lautaret, the peaks of which might be most conveniently attacked from this side; and across the range lies a pass, the *Col d'Arcines* (7,769'), leading to La Grave, and more direct, though more laborious, than the Lautaret. (See § 9.)

In ascending the valley of the Guisanne, the poor hamlets of Casset and La Madeleine are passed, occasional glimpses of the surrounding glaciers are gained; but none of the higher summits are visible from this side of the pass. A short way beyond La Madeleine the road quits the valley of the Guisanne, leaving on the right the track which follows the torrent to its source at the Col de Galibier (§ 6).

The summit of the *Col du Lautaret* is 6,740 ft. above the sea, according to Forbes; but owing to its situation in the centre of a glacier district, the snow lies longer here than on many Alpine passes of equal or greater height. The view of the peaks of the Pelvoux group, and the glaciers which stream down from between them towards the valley of the Romanche, is extremely grand. Throughout the descent, and even from the village of La Grave, the Aiguille du Midi (13,081'), towering 8,000 ft. above the valley at its base, is one of the most striking objects in the entire range of the Alps.

On the summit of the Col is an ancient stone building, on the site of a *Maison Hospitalier* founded in the eleventh century, which serves as a refuge in bad weather, and where wine, and sometimes bread and cheese, may be found. A peasant with his numerous family lives, or did live, there in a single room, after the fashion of Dauphiné, along with the cattle and various domestic

animals. A new inn was in progress in 1861.

The summit of the Lautaret and the slopes towards Villard d'Arène are celebrated for the variety of rare Alpine plants there to be found. A list would include a large portion of the Alpine flora.

The geologist will not fail to remark the singular relations of the liassic limestone strata on the W. side of the Col, with the adjoining crystalline rocks. In several places the former is seen to underlie extensive masses of gneiss, or semi-stratified granite, affording a remarkable example of the so-called fan structure. One section on the S. side of the valley opposite Villard d'Arène has been noticed and described by Elie de Beaumont; and Professor Forbes pointed out the existence of another, in the lower part of the mountain, which separates the main branch of the Romanche from that which leads towards the Col de Lautaret. The section is seen equally well from both sides of the promontory between the two torrents.

The new road avoids the group of houses, called *Pied du Col*, which stood by the old track, and after some long zigzags reaches the wretched hamlet of *Villard d'Arène*. About 2 miles farther, after passing through a tunnel more than 300 yards in length, it reaches the no less wretched village—

La Grave en Oisans (Inn: chez Juge, sometimes affords tolerable fare, sleeping quarters somewhat improved, dear, charge for a vehicle exorbitant), placed in the midst of grand Alpine scenery, at a height of 5,007 ft.: this would be a favourite resort for mountaineers, if cleanliness and comfort were not commodities unknown in the district. A *chasseur* mentioned by Mr. Elliot Blackstone in 'Peaks, Passes, and Glaciers,' would apparently be useful as a guide to anyone bent on exploring the neighbouring glaciers.

A short way below La Grave the road passes close to a very picturesque waterfall, and on the opposite or S.

side of the valley are the extensive lead-mines of *Les Freaux*. From hence to Le Dauphin scarcely a house is to be seen. The Romanche flows through a deep and gloomy ravine, called *La Combe de Malval*, which sometimes opens a little, and exhibits, in wild confusion, huge masses of rock torn down from the crags above; at other times the precipices approach more nearly together, and the glacier streams that reach their verge spring from a prodigious height into the chasm through which the road is carried. One of the finest of these cataracts is the so-called *Saut de la Pucelle* near to Le Dauphin, which may in some respects advantageously compare with the Staubbach. The cliffs forming the S. wall of the valley are crowned by the great *Glacier de Lans*, the largest in Dauphiné, which pours down portions of its frozen mass through the numerous gorges that open into the Combe. The Glacier de Lans is quite unexplored: it might probably be reached by a narrow valley joining the Romanche a little above Freney. The road crosses from the rt. to the l. bank of the Romanche a little above *Le Dauphin*, a hamlet with a poor inn, standing in the midst of huge fragments of fallen rock. About 2 miles farther is *Freney*, where rather better quarters may be found by a tired traveller. From hence two paths lead to the valley of the Arc in Savoy (Rte. C), and another leads in the opposite direction by a pass of no great height to Venos, in the valley of St. Christophe (§ 9).

Between Freney and Bourg d'Oisans the valley is contracted to a mere defile, enclosed between vertical rocks of gneiss. The Romanche has cut for itself a channel at a great depth below the level of the road, which is carried along the left bank, sometimes along ledges cut into the rock, sometimes supported on terraces of masonry, and in one case carried through a tunnel 234 yards in length. At the Pont de Guillerme the road crosses back to the right bank near the

confluence of the Venéon, and descends from the gorge into an open nearly level reach of richly cultivated country, enclosed between mountains of moderate height, forming an unexpected contrast to the scenery hitherto prevailing. In the midst of the open valley lies the town of *Bourg d'Oisans* (Inns: Hôtel de Milan, where the diligences stop, chez Martin, pretty good; H. Jossierand, 'very fair,' closed? F.E.B.; 'H. du Dragon'; Joanne). Here, as well as elsewhere in Dauphiné, the innkeepers take advantage of strangers whenever they can do so. A char from hence to Briançon costs 50 fr. There is nothing here to interest a stranger except the view of the opening of the Combe de Malval and the valley of St. Christophe, with the snowy range between, rising to a height of more than 8,000 feet above the streams which meet at its base, close to the town. The neighbouring mountains are rich in minerals. Extensive iron-mines are worked in the valley of the Olle, and gold and argentiferous lead are found in sufficient abundance to repay the working.

[Many interesting mountain excursions may be made from Bourg d'Oisans, several of which are incidentally described in this section. The passes leading to Uriage, and the chain of the Belledonne, are included in § 10. To a mountaineer, the most interesting objects in the neighbourhood are the peaks of the Grandes Rousses. The editor has not heard of any attempt to ascend these peaks, though some, if not all, of them are probably accessible. A traveller intending to attack them should take supplies with him from Bourg d'Oisans, and be prepared to bivouac at a considerable height, or else to pass an uncomfortable night in one of the higher châteaux. An easy excursion may be made to the Lac Blanc, which lies near the S. base of the central peaks. Passing by the high road the bridge over the Romanche opposite the Bourg, a track mounts nearly due N. by the villages of La Garde and Huez to the plateau of *Brandes*—about 2½

hours. Here are extensive remains of ancient buildings, popularly attributed to the Romans. The whole neighbourhood abounds in mineral wealth, and the guide will point out the site of many mines now abandoned. Higher up are considerable deposits of anthracite, which are worked in two places. An ascent of 1 hour from Brandes leads to the *Lac Blanc* (8,360'), one of the highest lakes, for its dimensions, in the entire chain of the Alps. It is nearly $\frac{1}{2}$ mile long and 110 yards wide, and is commanded by one of the peaks of the Grandes Rousses, about 11,000 feet in height. The distant view is very extensive. On the NE. shore of the lake are seen the traces of ancient mining works, and the remains of a paved road, constructed at some early period for the service of the miners. It is in some places either covered over or carried away by the moraines of existing glaciers. From the lake it is easy to descend by Clavans to Freney, in the valley of the Romanche.]

The road to Grenoble follows the course of the Romanche in a NW. direction for 5 or 6 miles, to its junction with the Olle, where it is turned aside at right angles to its previous course by the ridge extending from the Pic de Belledonne, to Vizille. The valley is again contracted in passing between the last-named peak and the Taillefer on the S. side, and is here called *Combe de Gavet*. The hamlets of *Livet*, *Rioupéroux* and *Gavet* are passed, and at nearly 16 miles from Bourg d'Oisans is the larger village of *Séchilienne*.

[From hence an interesting excursion may be made to the summit of the *Taillefer* (9,387'), which is said to command an admirable view of the higher Alps of Dauphiné. 1 hour 20 minutes suffices to reach the hamlet of *La Morte*, where, in case of need, sleeping quarters upon hay may be procured. From hence the ascent lies through pine woods and over open pastures, until the track approaches some steep rocks. A small tarn is left upon the right, and

the track keeps along the base of the rocks until an abandoned mine is reached, where lead ore and sulphate of barytes were formerly extracted. The way to the top lies along a ridge, called *Arête de Brouffier*, overlooking the glen of Valloire to the right and the Combe de Gavet on the left. The ridge leads to a small plateau usually covered with snow, and from thence a second ridge leads up to the highest peak. It is possible to descend by a steeper and more difficult way to Gavet on the N. side of the mountain, or by the E. face to *Ornon* (§ 9, Rte. L.), and thence to Bourg d'Oisans.]

In travelling from Bourg d'Oisans to Vizille the traveller may see some slight traces of one of the most remarkable geological catastrophes, whose history has been preserved by authentic records. In the course of the twelfth century a terrific landslide from the *Voudène*, a mountain on the N. side of the Combe de Gavet, completely barred the course of the Romanche, which rose to such a height that the plain of Oisans, where the Bourg now stands, was converted into a large lake, more than 30 feet deep. Villages and farms with a large part of the population utterly disappeared, and the survivors gained a subsistence by fishing on the site of their former dwellings, then known as the *Lac de St. Laurent*. This state of things continued until the night of Sept. 14, 1219, when the barrier gave way, and the pent-up waters, suddenly set free, swept with fearful violence down the valley. Of the villages near the banks of the river not a trace remained, and the inundation reached even to Grenoble, where crowds of fugitives, stopped in their flight by a gate over the stone bridge, were carried off by the flood. The present fertility of the plain of Oisans, and the transported blocks which are scattered over the valley about Vizille, owe their origin to this catastrophe, more enduring in its effects than the storms of war which have since repeatedly swept over the same district. About $4\frac{1}{2}$ miles from Séchilienne the

road reaches *Vizille* (Inns : Europe ; Parc ; both poor and dirty), an ill-built and wretched looking town, which nevertheless supports a thriving manufacturing population. The Chateau of the Constable Lesdiguières passed before the revolution into the hands of the Périer family, who have established here an extensive factory for cotton spinning and cotton printing, with other works, which give employment to 2,000 persons. The castle was destroyed by fire in 1825, but has been rebuilt nearly on the same plan as the former edifice, and the park remains nearly in the same condition as under its former owners.

Half-way between *Vizille* and *Grenoble* is *Clair*, where there is a remarkable bridge over the *Drac*, built in 1611, the parapets of which command a fine view of the surrounding mountain ranges.

GRENOBLE (Inns : H. de l'Europe, 'good and clean,' F.F.T.; H. des Ambassadeurs ; H. des Trois Dauphins), the ancient capital of Dauphiné, and a fortress of the first class, stands on the *Isère*, close to its junction with the combined streams of the *Drac* and the *Romanche*. No city in France, and scarce any elsewhere in Europe, enjoys so fine a position; but the filthy customs of the inhabitants make it a disagreeable stopping place for strangers. It is connected by railway with the main line from *Lyons* to *Marseilles* at *St. Rambert*. Five trains daily take nearly 3 hours to travel 57 miles. A more direct line to *Lyons*, by *Bourgoin*, is to be opened for traffic before the close of this year (1862). A line to *Chambéry* along the left bank of the *Isère* is in course of construction. At the shop of Messrs. *Maisonville*, booksellers and publishers, the traveller may find a large collection of works connected with local topography, history, &c. The geological essays of Professor *Lory*, and the botanical information contained in the sketches by *M. Antonin Macé*, deserve especial notice by the lovers of natural science. At the same establishment is published a collection of photographic views in Dauphiné and Savoy, by *MM.*

Muzet and *Bajat*, some of which are said to be excellent.

ROUTE B.

LA GRAVE EN OISANS TO ST. JEAN DE MAURIENNE—COL DE L'INFERNET.

A laborious day's walk of at least 12 hours.

The ascent commences immediately behind the village of *La Grave*, and commands fine views of the *Combe de Malaval* and the higher peaks of the *Pelvoux* group. After gaining the first step in the ascent, the path overlooks the stream which, falling over a ledge of granite, forms the beautiful cascade of *Les Freaux* (Rte. A). This stream intersects the junction of the granite with the overlying strata of (liassic?) limestone. Mounting through the ravine the traveller soon reaches the last village on this side of the pass, called *Chazelets*. From hence a continuous ascent leads to the *Col de l'Infernet*, whose height was estimated by Professor *Forbes* at 5,000 feet above *La Grave*, or about 10,000 feet above the sea. It was deeply covered with fresh snow when passed by him in August 1841. The summit commands a magnificent view of the glaciers and peak of the *Pelvoux* group seen across the valley of the *Romanche*, and the entire way from thence to *Chazelets* the same grand objects remain in view; so that there would be some advantage in taking this pass from the *Savoy* side. The descent from the *Col* to *St. Jean de Maurienne* is very long, and lies for many miles over limestone rocks, where no water can be obtained.

The above brief notice is taken from Professor *Forbes's* work, 'Norway and its Glaciers.' Further information is desired.

ROUTE C.

BOURG D'OISANS TO ST. JEAN DE MAURIENNE.

12 hours' steady walking by the Col d'Agnelin or Col du Pré Nouveau — nearly 13 hours by Col Ferrant.

A direct line drawn from Bourg d'Oisans to St. Jean de Maurienne would traverse the higher peaks of the mass of the Grandes Rousses, and to avoid this formidable obstacle it is necessary to make a considerable detour. The shortest route lies on the E. side of that range; but whichever of the three or four practicable courses may be taken, it will involve a long day's walk of from 12 to 15 hours.

The high road to Briançon is followed for about 8 miles until, a little above the hamlet of Freney (Rte. A), a bridge crosses the Romanche close to the junction of the *Ferrant* torrent. From hence a path mounts by steep zigzags to the hamlet of Mizöen, which commands a fine view of the Combe de Malval, and from thence descending to the bank of the torrent leads (in 1 hour from the bridge) to a point where the valley forks. The main branch mounts nearly due N. to the hamlets of *Clavans* and *Clavans d'en Haut*; but the traveller should keep to the rt. branch; and in 20 min. attains the wretched village of Besse. From hence he has the choice of three ways, of which the first described is the more direct, the second somewhat easier and more frequented, and the third rather longer and more interesting in point of scenery.

1. The track by the Col d'Agnelin mounts to the N. across mountain pastures, and, bearing somewhat to the rt., gains a grassy col or depression in the ridge, from whence it descends to the *Châlet du Vallon*, and soon after bends to the E. through an Alpine glen called *La Combe de Tirequoy*. On the rt. hand a track mounts very steeply to the S. towards a pass on the shoulder of the *Pic du Mas de la Grave* (9,917'), by which it is possible to return to

Besse. A little farther on another track mounts to the SE., and, passing a col, joins the path of the Col de l'Infernet (Rte. B). The true route here turns again to the N., and in 2½ hrs. from Besse gains the crest of the *Col d'Agnelin*, which lies immediately E. of the *Cime des Torches* (9,702'). From the Col the ravine of the Combe d'Agnelin descends abruptly towards the valley below, but the traveller keeps to the left along the slopes of the *Cime des Torches* until he gains the ridge which separates the *Vallon d'Entraigues* on the l. from the *Combe d'Agnelin* on his rt. hand. Along this ridge he descends in 1 hr. from the Col to *Vallonet*, 4½ hrs.' walk from St. Jean de Maurienne (§ 7).

2. If the traveller should prefer the more frequented path of the Col du Pré Nouveau, he must follow at first the track from the village of Besse as above described, but keep more directly to the N., until, after passing a rocky gap, he approaches the stream of *La Valette*, which descends nearly due S. through a glen, along which lies the path to the Col. After ascending for nearly 2 hrs. from Besse the stream is crossed, and the rt. bank followed for ½ hr. farther to the junction of two torrents, which unite to form the *Valette*. From hence less than ½ hour's ascent to the NE. suffices to reach the *Col du Pré Nouveau* (7,717'), a pass quite enclosed by the higher mountains on either side, and commanding no distant view. The pastures on both sides of the Col are of extraordinary luxuriance, owing, no doubt, to the rapid disintegration of the prevailing rock — an argillaceous shale. The descent is at first gentle, and then, after passing a *châlet*, becomes rather steep till, about ½ hour below the Col, the junction of two torrents is reached. From thence the path is carried along the E. side of a glen, abounding in rich pastures, and after passing a number of scattered hamlets, which make up the commune of *St. Sorlin d'Arves*, attains the village

of *St. Jean d'Arves*, where there is a rough inn. 2 hrs. suffice for the descent from the Col, but 4 should be allowed for the ascent when the pass is taken in the opposite direction. From *St. Jean d'Arves* it is possible to follow the *Arvan* to *St. Jean de Maurienne*; but the path which keeps to the E. side of the valley is very circuitous, and the more direct course is to mount from the former village to a low pass called *Col d'Arve*, from whence grassy slopes lead rapidly down, due N., to a torrent—a tributary of the *Arvan*. Again ascending for a short distance, the traveller reaches *Villarambert*, and, following the steep mule-track, descends to the next village of *Font Couverte*, and from thence to *St. Jean de Maurienne*, distant 3 hrs. from *St. Jean d'Arves*, but 4 hrs. when travelling in the opposite direction.

3. The route just described may be varied by following the more westerly of the two torrents which meet about $\frac{1}{2}$ hour below the Col du Pré Nouveau. The torrent is called *Grand Sauvage*, and descends from a peak of the same name, called also *Vermillon*, one of the range of the *Grandes Rousses*. Leaving on the l. a châlet called *Ovel*, the track turns to the right, and gains the dividing range at a pass called *Col Perrant*. The path which descends on the N. side joins that from the Col du Pré Nouveau in about $\frac{3}{4}$ hr. from the summit. This way involves a slight detour, but the Col Perrant has the advantage of commanding a very fine view. Each of the Rtes. here described is long and fatiguing, involving many separate ascents and descents, and the way, though nowhere difficult, is scarcely to be found without a local guide. It is quite possible to sleep at *Freny* or at *St. Jean d'Arves*, and so shorten the day's work.

For a more circuitous but less laborious way to *St. Jean de Maurienne* by the *Croix de Fer*, see next Route.

ROUTE D.

BOURG D'OISANS TO LA CHAMBRE.

13 hrs. by the *Combe d'Olle*, 10 $\frac{1}{2}$ hrs. by *Vaujany*.

Although the distance in a direct line from *Bourg d'Oisans* to *La Chambre*, in the valley of the *Arc*, is greater than to *St. Jean de Maurienne*, the way is somewhat shorter and less laborious; so that this is the easiest course for a pedestrian wishing to enter *Savoy* from the valley of the *Romanche*. In following the track by the valley of the *Olle*, a guide is scarcely required in fine weather, but it might be difficult for a stranger to find the short-cut by *Vaujany* without assistance.

On leaving *Bourg d'Oisans* the high road to *Grenoble* is followed for 5 m. to the hamlet of *Sables*, close to the confluence of the *Olle* with the *Romanche*. Crossing the latter river by the *Pont Rouge*, the track follows for a short distance the l. bank of the *Olle*, and then passing to the rt. bank by the bridge of *Pernière*, in $\frac{3}{4}$ hr. from *Sables*, or 2 $\frac{1}{4}$ hrs. from the *Bourg*, attains the large village of *Allemont* (inn is, or was, poor and dirty), overlooked by the ruined castle of *Rochechinard*, which commands a magnificent view of the glaciers of the *Grandes Rousses* and the other neighbouring mountains. The ranges which enclose the valley above *Allemont* are extraordinarily rich in metallic ores, which elsewhere are rarely or never found together. The iron-works are still in activity, but the silver-mines, which have been worked at intervals for nearly a century, have but ill-repaid their promoters, whether from the inherent difficulties of the undertaking, or from want of capital and skill in the management. [The last-named mines, situated on the mountain called *Chalanches*, at about 4,000 feet above the village, may be reached in 2 $\frac{1}{2}$ or 3 hrs., and cannot fail to interest the mineral-

ogist. On this single mountain, gold, silver, mercury, nickel, cobalt, copper, zinc, iron, manganese, and antimony, have been found variously combined, besides beds of anthracite.]

From Allemont the way to La Chambre follows the right bank of the Olle due N. for 3 hrs. ($2\frac{1}{2}$ hrs. descending) to the hamlet of *Rivier* (no inn), which stands several hundred feet above the torrent. The scenery is rich and pleasing, with some fine views of the mountains which enclose the valley. Above *Rivier* the *Combe d'Olle* turns to the eastward, and the scenery becomes wilder. Passing close to a fine waterfall, the track enters the *Défilé de Maupas*, leading in 2 hr. from *Rivier* to a large châlet, frequented by shepherds from Provence, called *La Grande Maison*. This is opposite to the junction of the *Cochette* torrent, which descends from the SE. to join the Olle. The valley here gradually turns to the NE., and many tributary torrents are passed. The first, on the right bank, called the *Laune*, leads by the *Col d'Agnelin* (not to be confounded with that so named in Rte. C) in 2 hrs. to the *Lac du Col*, or *du Cos*, one of the *Sept Laux* (Rte. E).

Rather more than 1 hr. above *La Grande Maison*, keeping to the rt. bank, the track reaches the châlets of *Plan du Seuil* close to the junction of the two streams, which make up the Olle. One of these descends from the S. through a wild glen called *Combe de Bramand*, containing a succession of small lakes, of which the highest lies at the base of one of the northern peaks of the *Grandes Rousses*. The other branch of the valley leads nearly due E. to the *Col de la Croix de Fer*, about 6,500 feet in height, over which lies a path to *St. Sorlin d'Arve* and *St. Jean de Maurienne*. This way might be taken in preference to those described in the last route; but, though easy, it is very circuitous, and requires 14 or 15 hours' walking from *Bourg d'Oisans*.

The track to *La Chambre* quits that of the *Croix de Fer* about 5 min.

beyond the *Plan du Seuil*, and, turning to the N., mounts in $\frac{1}{4}$ hr. to the *Col du Glandon* (about 6,500'), at the head of a lateral valley of the same name, which descends in a nearly straight line to the main valley of the Arc. By the route above described, the *Col* is $1\frac{1}{2}$ hr. from *La Grande Maison*, and nearly 9 hrs. from *Bourg d'Oisans*. The descent is at first rather rapid, and then more gentle, following the rt. bank of the torrent, and passing by many châlets in the midst of rich pastures. About $1\frac{1}{2}$ hr. from the *Col*, the large village of *St. Colomban des Villards* is passed, and $\frac{1}{2}$ hr. farther the first of the scattered hamlets which make up the commune of *St. Alban des Villards*. The valley of the Arc is reached about 1 mile above *La Chambre* (§ 7, Rte. A), 4 hrs. from the *Col*, and about 13 hrs. from *Bourg d'Oisans*.

A glance at the map will show that the valley of the Olle between *Sables* and the *Col du Glandon* describes a wide curve, and thereby involves a long detour. There is another much more direct but rather more laborious way, by *Vaujany*, which, however, is not easily found without a guide.

In following the track above described from *Sables* to *Allemont*, the way to *Vaujany* leaves on the l. hand the bridge of *Pernière*, and mounts along the E. side of the valley of the Olle to *Oz*, a small village, surmounted by the remains of an ancient stronghold, about 1 hr. from *Sables*. Here, quitting the *Combe d'Olle*, the path follows the *Flumet* torrent, and in 40 min. reaches

Vaujany (4,211'), the highest commune in the valley. To the E. a rocky gorge leads up to two small lakes which receive part of the drainage of the glaciers of the *Grandes Rousses*. The direct way to the *Col de Glandon* continues to mount along the rt. bank of the *Flumet*, passing on the l. hand a track which passes over the *Col du Sabot* to the valley of the Olle. $\frac{1}{2}$ hr. above *Vaujany* the path crosses to the l. bank, and about 20 min. higher up the *Flumet*

is enlarged to a small lake; the path again crosses the stream, and, bearing a little to the l., mounts to the *Col de Couard*, $1\frac{1}{4}$ hr. above Vaujany. E. of the Col are seen the extensive glaciers of *Cochette* and the peak of the *Grand Sauvage* (11,395'), one of the higher summits of the *Grandes Rousses*. A descent of 40 min. along the rt. bank of the *Cochette* torrent leads to the *Combe D'Olle*, a short way above the *Grande Maison*, which is thus reached in $5\frac{1}{4}$ hrs. from *Bourg d'Oisans*, instead of nearly $7\frac{1}{2}$ hrs., as by the way, first described, through the *Combe d'Olle*. By the shorter way, *La Chambre* may be reached in $10\frac{3}{4}$ hrs'. steady walking, exclusive of halts.

ROUTE E.

BOURG D'OISANS TO ALLEVARD—LES SEPT LAUX.

17 hrs'. walk — 9 hrs. to the fisherman's hut —
8 hrs. from thence to Allevard.

This is an interesting excursion, though somewhat overrated by the writers of local guides. The distance is rather too great for one day's walk, even with the assistance of a char, which might be taken from *Bourg d'Oisans* to *Sables*, or from *Allevard* to *Ferrière* when the pass is taken in the opposite direction. Most persons will find it better to sleep at *Ferrière*, or at the fisherman's hut near the *Lac du Cos*. Mules may be taken as far as *Rivier*, or for about $4\frac{1}{2}$ hours when mounting from *Allevard*. A guide is required for this route.

The way from *Bourg d'Oisans* to the *Sept Laux* follows for about $5\frac{1}{4}$ hrs. the track through the *Combe d'Olle* (described in last Route) as far as *Rivier* (4,200'). From thence the ascent is rapid, towards the N., partly through stunted pines and over rough

débris, until it reaches the base of a narrow couloir which mounts very steeply amidst nearly vertical rocks. This, which is called *Cheminée du Diable*, is not very difficult to clamber up, but the descent is not easy, and in bad weather might be positively dangerous. After a laborious climb of about 3,000 ft. from *Rivier*, the track reaches the summit of the *Col de l'Homme* (7,144', Forbes ?), about $2\frac{3}{4}$ hrs. from *Rivier*, commanding a fine view in both directions, but especially of the peaks and glaciers of the *Grandes Rousses*. On the rt. hand are seen two of the seven lakes whose outlet is towards the *Olle*.

[A short distance before reaching the summit, a track turns off to the l., and in about $\frac{3}{4}$ hr. attains another pass, called *Col de la Coche*, which leads, in $4\frac{1}{2}$ hrs., by *Laval*, to *Villard Bonnot*, on the high road from *Grenoble* to *Montmeillan* (§ 10). This is the shortest way from the *Sept Laux* to *Grenoble*; but for persons going thither from the valley of the *Olle* there is a more direct path from *Rivier* to the *Col de la Coche*.]

In less than 1 hr. from the Col the track reaches a *cabane*, inhabited during two or three months of summer by two fishermen. Food (occasionally meat) and wine, with tolerable night-quarters, may be had here by those who may wish to break the journey to *Allevard* or to ascend some of the neighbouring summits. It is close to the *Lac du Col* (7,154'), one of the highest of the group of lakes which lie near together among the cluster of peaks which separate the *Combe d'Olle* from the sources of the *Bréda*. The largest, which happen to lie near the track here described, are seven in number, two of them with an outfall to the S., and four others occupying successive steps in the descent from the *Lac du Col* towards the N. Several smaller lakes are near at hand. The scenery has more of wildness than sublimity; but it affords an agreeable change for water-drinkers from *Uriage* or *Allevard*.

[From the fisherman's hut it is easy to

ascend the *Rocher Blanc* (9,616'), also called Pic de la Pyramide, which commands a very extensive view of the Savoy and Dauphiné Alps. The way passes by the *Lac Blanc* (7,519'), often frozen over, and ascends by a small glacier to the upper ridge of the mountain. Time from the hut—about $3\frac{1}{2}$ hrs.]

The descent towards the N. is very gentle for the first hour, until, after passing the Lac Noir, the lowest of the Sept Laux, the slope becomes gradually more rapid and leads down to a pretty cascade. Lower down the path makes many zig-zags, and reaches a shelf in the valley where stands the *Châlet du Gleyzin* (5,249'), 3 hrs. from the Col, commanding an extensive view to the N. There is a short cut from the Lac Noir to this *châlet*, but the way is often overflowed : before taking it local information must be sought at some of the upper *châlets*. Another steep descent is requisite to gain the next step in the valley, a wooded plateau, where the path crosses a stream and then follows a slope, where beeches appear among the pines and birches. The path here passes within a few minutes' walk of the *Cascade du Pissou*, a fall of the Bréda, which enjoys some local celebrity, and involves a very slight detour.

[Close to the waterfall, towards the E., is the opening of the *Combe de Madame*, a glen through which a path on the rt. bank leads in 2 hrs. to the *Col de la Croix* (8,392'), and in 4 hrs. farther through the valley of the Glendon to La Chambre (see Rte. D).]

A short way lower down another glen opens on the l. hand. [This is one of the most frequented routes from Grenoble to the valley of the Bréda, and the most agreeable, though not the shortest, way either from Allevard or the Sept Laux to that city. 2 hours suffice for the ascent from the Bréda to the *Col du Merdaret* (6,036'), which commands as extensive a view as many more lofty points. If the shortest way be taken 2 hours more will lead the traveller to Theys ; but there are several paths, some of them circuitous. *Theys* is said

to have the finest position in the valley of Graisivaudan : it has an Inn (chez Coliquard) and a café (chez Flavin), where tourists from Grenoble are accustomed to find guides for the neighbouring mountains. The Père Natal is recommended. Theys is 33 kil. or $20\frac{1}{2}$ m. by carriage road from Grenoble, and 5 miles from *Tencin* (§ 10, Rte. C.), from whence an omnibus to Grenoble plies during the summer.]

Following the track down the valley of the Bréda, in about $1\frac{1}{2}$ hour from the *Châlet du Gleyzin* the traveller reaches the hamlet of *Grand Thiervoz*, passing the opening of the *Combe de Valloire*. [Through this lateral valley another pass leads to the valley of the Arc at La Chambre. To avoid the narrow gorge through which the torrent rushes to join the Bréda, the path mounts the slope above the stream on the right bank, then crosses to the opposite side, and makes a detour to reach the farther side of a lateral ravine. In less than 1 hr. the path returns to the rt. bank at the *Châlet de Valloire*, and mounts easily to the upper end of the glen, occupied by three small lakes. From hence a steeper ascent leads to the *Col de Valloire* (about 8,200') between two peaks, each exceeding 9,000'. This is reached in 2 hrs. 20 min. from Thiervoz. On the side of Savoy the track keeps to the l. bank of the torrent, and in $2\frac{1}{2}$ hrs. reaches St. Alban des Villards ; from thence to La Chambre $1\frac{1}{2}$ hr.: in all 6 hrs. 35 min. from Thiervoz.]

About a mile below Thiervoz is the village of *La Ferrière* (Inn: chez Jourdan, tolerable quarters, civil people), a frequent resort of tourists, who sleep here before starting for mountain expeditions. Guides, mules, and provisions are found here. The descent to Allevard is picturesque and agreeable, by a tolerably good mule-path, often under the shade of fine trees. 2 hrs. suffice for the descent, 2 hrs. 20 min. in ascending. Half-way is *Pinsot*, at the junction of the Gleyzin torrent with the Bréda, where the path crosses to the right bank of the united streams. From

hence the ascent of the *Gleyzin* (9,275') is sometimes made. It is a laborious day's work from Allevard, and the view is not equal to that from the Pic du Frêne. 1 hr. below Pinsot is *Allevard*. (See § 10.)

ROUTE F.

ALLEVARD TO LA CHAMBRE — PIC DU FRÊNE.

In the preceding Rte. two passes from the valley of the Bréda to La Chambre have been incidentally described. By the first of these — the Combe de Madame — the distance from Allevard is about $9\frac{1}{2}$ hrs. walking; by the Col de Valloire about $8\frac{3}{4}$ hrs. will suffice. A more direct way is by the Col de Merlet, by which an active pedestrian will require about 8 hrs. only; in each case exclusive of halts.

Leaving Allevard (§ 10) by a path which mounts above the iron works, the hamlet of Panissières is reached in 40 min. Beyond this the track follows the valley of the *Veyton* torrent, sometimes close to the stream, sometimes at a height above it, till in $2\frac{1}{4}$ hrs. it attains the Châlet de la Chevette, where it is usual to halt for breakfast. From hence it is easy to reach the Petit Charnier (6,969') in about 2 hrs., on the loftier peak of the *Grand Charnier* (8,412') in $3\frac{3}{4}$ hrs. The latter commands an extensive view, but it is overlooked by its neighbour, the Pic du Frêne.

The path to the Col, soon after passing the châlet, reaches the base of a long and steep slope, called Tirequoy, which is climbed by numerous zigzags. This leads to a rocky hollow, or cirque, followed after another ascent by a second cirque, and this again by a third, still wilder and more desolate. $\frac{1}{2}$ hr. farther the last châlet is passed, and all trace of path disappears amid the

loose rocks intermixed with patches of snow that lead up to *Col de Merlet* (7,527'), midway between the *Grand Moretan* (8,888') to the S., and the *Pic du Frêne* (9,203') to the N.

The descent lies at first down a huge pile of débris, below which stands the highest châlet on the Savoy side of the pass. Keeping to the N. side of the torrent two hollows forming successive steps in the descent are passed, and then the torrent is crossed to and fro three times, till, after passing the châlet of Velléchaud, the traveller finds himself on the verge of a precipitous slope, down which the stream plunges in a succession of rapids and waterfalls. The track keeps to the right, and winds down the side of the mountain until, in the valley below, it falls into a rough char-road. This will lead to Molard, the chief hamlet in the commune of St. Alban des Villards; but there is a shorter way by a rough path following the bank of the torrent. Molard may be reached in $1\frac{1}{2}$ hour from the Col, and it is about equally far from thence to La Chambre by the valley of the Glandon. (See Rte. D.)

[Another pass, about 8,200 ft. in height, more difficult and rarely used, passes on the N. side of the *Pic du Frêne*, and is called *Pas du Frêne* or *Col des Pierres*. This is reached from Allevard by following up to its head the valley of the Bens torrent, or Combe de St. Hugon (§ 10, Rte. D). In 4 hrs. from the Baths, this leads to a plateau surrounded by snow slopes, from whence a path to the right crosses by the *Col de Bourbière* to the valley of the Veyton and the track of the Col de Merlet, while, by keeping to the left, an ascent of $\frac{1}{2}$ hr. leads to the Pas du Frêne. Below the pass on the side of Savoy is a small lake. From thence is apparently the only practicable way to reach the summit of the peak, which commands one of the finest panoramas of this part of the Alpine chain. From the lake the ascent is up steep slopes of debris, until reaching the rocks which form the highest ridge. The last part is difficult, especially the passage of a nearly ver-

tical couloir at more than 600 feet above its base. The peak was one of the stations used in the measurement of the arc of the mean parallel.]

SECTION 9.

PELVOUX DISTRICT.

As stated in the introduction to this chapter, the almost isolated group of high Alps, of which the Pelvoux bears the only well-known name, lies between the Durance, the Romanche, and the Drac, in an irregular triangle, whose sides are about 45 miles long. If the level of the sea were raised 5,000 feet, the entire district would form a single peninsula, connected with the Cottian Alps by a narrow neck of land which forms the Col de Lantaret. Nothing can be more irregular and complicated than the disposition of the ridges which go to make up this highland region; and the direction and grouping of the valleys shows a similar absence of apparent order. The three ridges which include all the highest peaks, excepting the Mont Pelvoux, show indeed indications of a regular plan, for they form the sides of a quadrangle open to the W., and following pretty closely the direction of the cardinal points. Farther S., again, the valleys show a general tendency to keep to the direction E. and W.; but a number of lofty promontories, including peaks of 11,000 ft. and upwards, diverge in every direction, and between these, short and tortuous valleys bear down the drainage of the glacier fields which cover the upper level. The position of the principal peaks and passes will be made more clear by reference to the annexed map and the outline sketches in Routes A and B. The group offers abundant scope for the adventurous traveller, for many of the loftier peaks, including the two, perhaps the three, highest, are yet unascended; and of

the Alpine valleys S. of the Vallouise scarcely any information has yet been published.

The first ascent of the Mont Pelvoux was made by the Commandant Durand, with a party of Engineers under his command, who remained, in 1828, for two or three days on the upper plateau of the mountain. The next was by M. Puisieux, in 1848.

The best, and almost the only tolerable inn in this district is that at Venos; but although there are new peaks to be scaled, and almost unknown glaciers to be explored, in the neighbourhood of that village, it is inconveniently distant from the higher summits. A portion of the glaciers of the central group might be visited from Monestier in the valley of the Guisanne. (See § 8, Rte. A.)

In regard to the position and names of the higher peaks, it would be impossible to note in detail the numerous errors contained in all the published works relating to this district; and it suffices to say that the map here given is based upon the results of the General Survey of France, with several additions and a few corrections by Mr. Tuckett.

ROUTE A.

BOURG D'OISANS TO LA BÉRARDE — VALLEY OF THE VENÉON.

	Hours' walking	English miles
Venos	2½	8½
St. Christophe	2	6
La Bélarde	3	9
	7½	23½

Although a good walker may accomplish the distance in the time here indicated, exclusive of halts, the track is so rough that a horse or mule will take considerably more time.

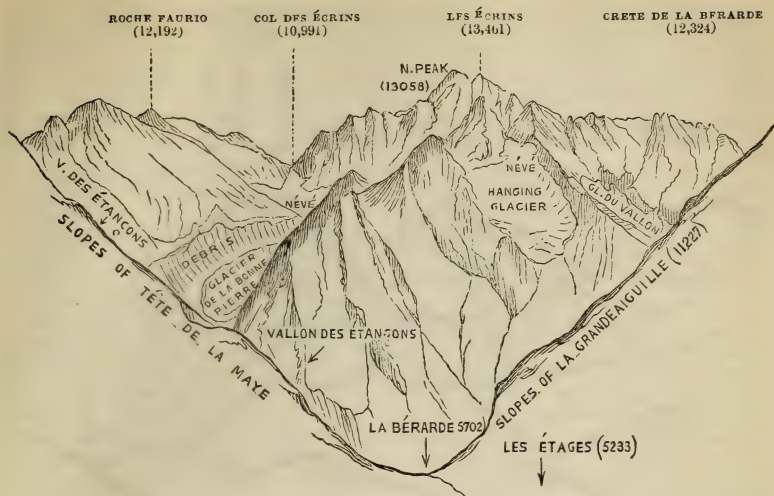
The highest ridges of the Dauphiné Alps form, as has been said, a quadrangle

closed to the N., E., and S., but open to the W. All the streams that fall into the interior of this great enclosure unite in the bed of the Venéon, which flows at first W., and then NW., till it joins the Romanche, which drains the outer side of the northern ridge of the quadrangle. It naturally follows, that the easiest way to reach the centre of this highland region is to follow the valley of the Venéon.

The junction of this stream with the Romanche is very near to Bourg d'Oisans, on the high road from Grenoble to Briançon, and little more than 30 m. from the former city, whence it may be reached in $5\frac{1}{2}$ hrs. by diligence or hired vehicle. (See § 8, Rte. A.) From the open valley about Bourg d'Oisans the course of the Venéon seems to be the natural prolongation of this part of the valley of the Romanche, the gorge through which that stream descends from La Grave being too narrow to be perceived from a distance. The path to La Bérarde leaves the high road at the Bourg, and follows the broad torrent of the Venéon across the plain for about 1 hr., until the high walls of limestone rock on either hand show that the traveller has entered the valley through which it bears down the drainage of more than twenty glaciers. Keeping to the l. bank of the stream amid scattered blocks, the track reaches *Pont Escotier*, where the scenery increases in grandeur. Looking back, the plain of Oisans is seen enclosed by mural precipices, and backed by the bold crags of the Belledonne. In front are two savage valleys. That seen to the rt., the *Vallon de Lovitel*, enclosed by a precipitous range, whose highest point is the *Clapier du Peyron* (10,407'), leads by the *Lac de Lovitel* to a difficult pass to Valsenestre (Rte. M). To the l. is the valley of the Venéon, backed by a snowy peak, and in the middle distance is the only green patch amid the rugged rocks which make up the prevailing character of the scenery. This marks the site of the village of *Venos* (Inn: chez Paquet, excellent for Dauphiné,

and would be thought tolerable elsewhere), standing on a slope above the valley. The luxuriant vegetation is due to the presence of a shaly limestone. A tongue of this formation extends from the valley of the Romanche and traverses that of the Venéon, as though lying in a trough amidst the surrounding crystalline rocks. Two passes connect Venos with the adjoining valleys to the N. and S., and both lie in great part over these anomalous deposits. That to the N., called *Col de Venos*, and commanding a magnificent view, leads to Freney in about 3 hrs. In the opposite direction the *Col de la Muzelle* (about 8,200') leads in $3\frac{1}{4}$ hrs. to Valsenestre, and in $\frac{3}{4}$ hr. more to La Chapelle in Val Joffrey. (See Rte. M.)

Above Venos there is no exit from the main valley over the lofty ridges which enclose it for about 35 m. save by high and difficult glacier passes. There is perhaps no other valley in the Alps, unless it be that of St. Nicholas, so completely shut in as this. On leaving Venos the path descends to the river, crosses to the rt. bank, and enters a gorge unsurpassed for ruggedness and desolation. Some overhanging peak must have fallen and left here its shattered fragments as a memorial of the catastrophe. One huge slab has fallen across the stream which is traversed by this natural bridge. A little farther the track ascends the slope of the mountain on the rt. bank of the torrent to avoid the narrow cleft through which this forces its way, and then, after passing opposite the picturesque opening of the *Vallon de l'Enchatra*, descends to the level of the stream. After crossing the *Torrent du Diable*, which drains the *Glacier de la Selle* (Rte. I), another rather steep ascent leads to the village of *St. Christophe* (4,823') (Inn beside the church, without a sign, poor, no meat, but a bed-room under a separate roof is less dirty than usual). The slopes above the village command fine views of the snowy peaks which separate the upper valley of the Venéon



THE COL AND POINTE DES ÉCRINS SEEN FROM THE SLOPES N.W. OF LES ÉTAGES.

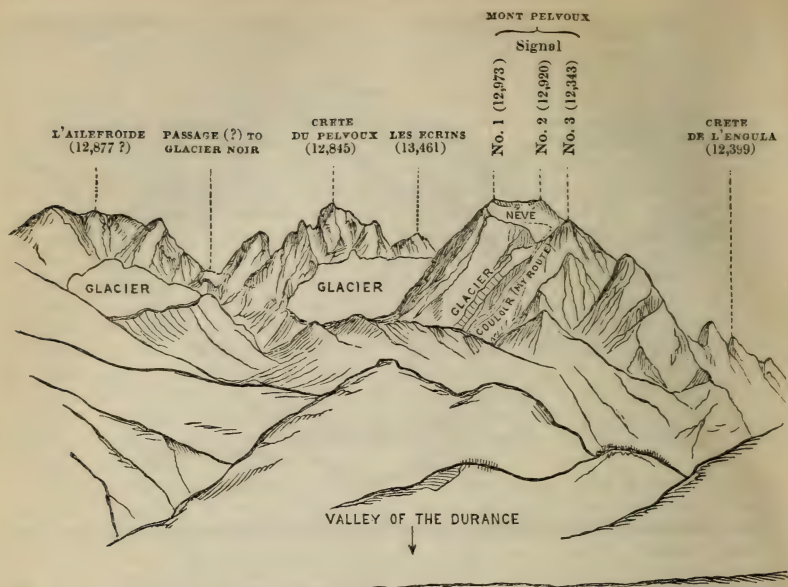
from the Vallon de la Muande, leading by the rarely used glacier pass called *Col de la Muande* (10,036') to the Val Godemar. On the way up the valley to La Bérarde the track leading to the last-named Col is seen to cross the Venéon about 1 hr. above St. Christophe, and the main valley then turns due E. Before long the great range of snow-seamed peaks that bars the head of the valley begins to appear, and at the poor hamlet of Les Etages the Pointe des Ecrins, the highest summit of the entire group, flanked by attendant aiguilles only less bold than those of the valley of Chamouni, comes fully into view. The above outline sketch gives an accurate representation of the position and names of the principal objects seen from the slopes above Les Etages.

About $\frac{3}{4}$ hr. farther is the last hamlet in the valley, *La Bérarde* (5,702') where very wretched accommodation, may be had at the house of the two Rodiers, of whom the elder acted as guide to Professor Forbes, but is now past active work. His son is a good mountaineer,

and pretty well acquainted with the neighbouring glacier passes, but many complaints have been made of unreasonable demands, and of unfair means to extract additional francs from the pockets of the few strangers who have occasion for his services. Perhaps it is unreasonable to complain of such a natural result of monopoly. It does not appear that the high pay which he receives (45 fr. for any of the glacier passes) has been applied to make his house more attractive to travellers.

The position of La Bérarde bears a remarkable similarity to that of Entrèves above Courmayeur. Here, as in the Allée Blanche on the S. side of Mont Blanc, two torrents flowing in opposite directions along the base of a great snowy range, receive the drainage of the glaciers that descend through short lateral valleys, and meet at a central point, from whence they escape through a channel at right angles to their previous course, in the form of a T.

The passes leading from La Bérarde are described in Rtes. C, D, E, and F,



THE AILEFROIDE, ÉCRINS, AND PELVOUX, FROM ABOVE GUILRESTRE.

so far as materials have been available. No precise information has been obtained respecting another very rarely-used pass, the *Col des Cavales*, by which La Grave en Oisans may be reached in one day from La Bérarde. The ascent on the W. side is by very steep rocks above the *Vallon des Étançons*, the northern of the two glens which meet at La Bérarde, and after passing a considerable extent of glacier it descends at or near to the Châlets de l'Alpe. (See Rte. G.)

Among the many rare plants seen in this district, the botanist will not fail to notice *Berardia subacaulis*.

ROUTE B.

GUILRESTRE TO VALLOUISE—ASCENT OF THE MONT PELVOUX.

La Bérarde has been described in the last route as the most central place for excursions among the higher peaks of the Pelvoux group, but the Mont Pelvoux itself is not accessible, nor even visible, from La Bérarde or any point in its vicinity. To approach that peak or the great glaciers which encompass it, the only convenient access is by the valley of the *Gironde* torrent, which joins the Durance at La Bessée on the high road from Mont Dauphin to Briançon. This is also the natural course for travellers approaching the Pelvoux district from the side of Italy. The best general view of the high peaks surrounding the Mont Pelvoux from the neighbourhood of Guilestre, but the second peak—La Meije—is concealed by the Pelvoux. The above outline will assist future explorers.

The Vallouise is easily reached from Guilestre, (§ 4, Rte. A), by way of Mont Dauphin and La Bessée. The inn-keeper asks 10 fr. for a carriage with one horse to the latter place, and 18 fr. to Ville Vallouise. The high road to Briançon is very well kept, but the char-road through the Vallouise is very rough, and little time is saved by taking a vehicle.

La Bessée (Inn: filthy and extortionate), a poor village about half-way (2½ hrs. in a carriage, 3½ hrs. walking), between Guilestre and Briançon, close to the junction of the Gironde with the Durance. Here dwells Jean Reynaud, who accompanied Messrs. Whympers and Macdonald in their ascent of the Pelvoux, and likewise Jean Giraud, of whose qualities as a mountaineer Mr. Whympers gives a good account. A tolerable char-road ascends the valley as far as the principal village of *Vallouise*, called for distinction *La Ville de Vallouise*, where, close to the bridge, there is a rough inn, but tolerable for Dauphiné, chez Giraud. Distance from *La Bessée* 1½ hr. good walking. At *La Ville* the main branch of the torrent, called the *Gyr*, is joined by the *Onde*, a glacier stream which descends through the *Vallon d'Entraigues* from the Col de Célar (Rte. F), the united stream being called *Gironde*.

After crossing the river at *La Ville*, the road up the Vallouise follows the l. bank as far as the village of *Claux*, where the path to the Col de l'Echauda (Rte. H) turns off to the right. Above *Claux* two paths ascend the main valley, but that usually followed crosses the river and ascends by the rt. bank. 'The valley here loses its pastoral character, and becomes wilder and more Alpine. The path winds among huge lichen-stained blocks, beneath the shade of scattered larches, and past rounded domes of rock scored and chiselled by ancient glaciers, while in a deep ravine on the rt. roars the torrent which bears down the united drainage of the E. and S. flanks of the Pelvoux.'—[W. M.]

Ailefroide, 1¾ hr. from Vallouise, consists of a few filthy chalets in the midst of a little triangular plain, where potatoes, oats, &c., are still cultivated. The mass of the Mont Pelvoux is a very grand object throughout the ascent from *Claux*.

Two rugged valleys meet at this point, bringing into a single stream the drainage of the opposite sides of the Mont Pelvoux. Flowing from the W. the *Selsenière* or *Sapenière* torrent receives the glacier streams from the S. and SW. sides of the mountain, as well as the drainage of the glacier of Sélé, at the head of the valley; while the Torrent de St. Pierre, descending along the E. base, bears the united streams from the Glacier Noir and the Glacier Blanc, the former of which wraps itself round the highest peaks on their N. and NW. sides. It would appear that the only practicable route to the summit is by the S. face, and therefore by the valley of *Sapenière*. This is a barren and dreary glen, the fitting scene of a horrible tradition which recounts that, during the Vaudois persecutions, the population of Vallouise took refuge in a cavern called *La Balme Chapelu*, where they were all destroyed by the same process that was applied to certain Arab tribes in Algeria by the present Governor of that colony. The accounts are not very consistent in regard to dates and other details, but have probably some foundation in fact. Most of those who have attempted the ascent have passed the preceding night at a spot called *Soureillan* (7,312'), also called *Cabane des Bergers de Provence*, where shelter is found under huge blocks of stone, and wood is plentiful. Mr. Tuckett states that there is a shorter way to reach this halting-place from *Ailefroide* than that usually taken by the *Combe de Sapenière*, but in either case the distance appears to be about 2 hrs. walk. In each of the two successful attempts to reach the highest point the travellers bivouacked in an exposed position, considerably higher than *Soureillan*; but this appears to be

quite unnecessary. Ascending for 2 hrs. from Soureillan, a small glacier called Clot de l'Homme is met. This narrow ice-stream is the outflow of the snow-fields that cover the highest plateau of the mountain. The earlier explorers seem without exception to have crossed this glacier, and then to have climbed the steep buttresses of rock that are piled tier over tier above it on the western side. This too was the course taken by Messrs. Whymper and Macdonald, who with their guides reached the highest peak in 1861; but Mr. Tuckett, who made the ascent in the following year, with Michel Croz of Chamouni and Peter Perrin of Zermatt, discovered a practicable couloir on the E. side of the glacier, by which he ascended direct without touching the glacier till within 500 or 600 ft. of the upper snow-field. This course must greatly facilitate the ascent; as it would appear from Mr. Whymper's account in the Second Series of 'Peaks, Passes, and Glaciers,' that his party employed about 8 hrs. in climbing the same height, which by the new route Mr. Tuckett accomplished in $3\frac{1}{2}$ hrs. The latter gentleman encountered no serious obstacle except at one point, shortly before gaining the upper plateau. Having overcome this difficulty $\frac{1}{2}$ hr. sufficed to reach the highest summit. The *Mont Pelvoux* has somewhat the form of a flattened basin, with the edges irregularly chipped, and with one side quite broken away, supported upon a conical pedestal of rock, everywhere very steep and in most places utterly inaccessible. It fortunately happens that the rocky pedestal is least steep at the point which leads up to the breach in the upper basin. Three principal peaks may be distinguished. The highest, from the mean of several observations, Mr. Tuckett has estimated at 12,973 ft. The second and middle peak is marked by a signal, or cairn of stones, still standing, erected in 1828 by M. Durand. From Mr. Tuckett's observations this is but 47 ft. lower than the first. The third and most easterly peak, the

nearest to Ailefroide, is but 12,343 ft. in height. Mr. Tuckett remained nearly 4 hrs. on the summit, engaged in taking with a theodolite the azimuths and zenith distances of the principal summits of the Dauphiné Alps, as well as many other more distant peaks. Of the first at least two surpass the Pelvoux in height. The highest of all, as is now certainly ascertained, is the *Pointe des Ecrins*, or *Pic des Arcines* (13,462'), seen to the NW. about $2\frac{1}{2}$ m. distant, and separated from the Pelvoux by the wide upper basin of the Glacier Noir. Farther to the N., and fully three times as distant, is the *Meije*, or *Aiguille du Midi de la Grave* (13,081'), the highest of a group of pinnacles, several of which approach the same height. There remains a third summit, lying WSW. from the Pelvoux, and called by the French engineers *Pic d'Ailefroide*. This is the peak seen on the extreme l. of the outline sketch from Guilestre, whose grand western face is sketched at p. 209 of Vol. II. of the Second Series of 'Peaks, Passes, and Glaciers.' From the triangulation of the French engineers, it would appear to be 90 ft. lower than the Pelvoux; but Mr. Tuckett found it to be a little above the level of the latter, and between points so near together an error is scarcely possible. For the present it must remain doubtful whether this should rank as third or fourth among the peaks of the Dauphiné Alps.

2 hrs. are sufficient for the descent from the summit to the base of the couloir, and from thence Ailefroide may be reached in 3 hrs., or even less; so that it is quite possible to return to Ville Vallouise on the same day.

Unless the route discovered by Mr. Tuckett should be found impracticable hereafter, owing to changes in the upper glacier, it would appear that the ascent of the Pelvoux presents no unusual difficulties. The excursion is interesting, not only because it introduces the traveller to one of the least-known portions of the Alps, but because of the extent, novelty, and grandeur of

the more distant panorama. It appears probable that the Mediterranean is not under any circumstances visible from this or the neighbouring peaks.

ROUTE C.

LA BÉRARDE TO VALLOUISE BY COL DES ÉCRINS. POINTE DES ÉCRINS.

This is an expedition of the highest interest, traversing the very centre of the Dauphiné Oberland, and passing close to the base of its highest peak. The pass was first made by Mr. Tuckett on July 12, 1862, from the side of Valloise, and he estimates the distance at not more than 10 hrs. of actual walking; but it might often require a longer time. It may, in some respects, be compared to the Strahleck. The extent of glacier to be traversed is not so great, but in some states of the snow the couloir on the W. side of the Col would present more serious difficulties than any encountered on the Bernese pass.

The outline sketch in Rte A. shows the exact position of the Col, at the lowest point in the ridge connecting the Pointe des Ecrins with the Roche Faurio (12,192').

On leaving La Bérarde the course is at first to the N., through the Vallon des Etançons, but in less than a mile from the village the stream from the *Glacier de la Bonne Pierre* is crossed, and then the ascent commences. The lower part of the glacier is steep and much crevassed, so that it is necessary to follow the moraine of the rt. bank over steep débris and loose blocks, a description of path which few persons find agreeable. After achieving a great part of the ascent in this manner, the slope of the glacier becomes more gentle, and there is no difficulty in following it up to the base of the snow

couloir which descends from the Col. This is more than 1,300 ft. in vertical height, and of extreme steepness. Like all similar slopes, its condition is constantly varying according to the state of the snow. It should not be attempted at too early an hour, nor after fresh snow. Mr. Tuckett took $2\frac{3}{4}$ hrs. for the descent from the Col to La Bérarde, but probably $4\frac{1}{2}$ or 5 hrs. should be allowed for the ascent. By the mean of several observations, the height of the Col is 11,071 ft., about 5,370 ft. above La Bérarde. The pinnacles and precipices of the Pointe des Ecrins, especially when seen from the upper part of the *Glacier de la Bonne Pierre*, present a scene of the grandest character. The Col leads at once to the snow-field which forms the upper plateau of the *Glacier Blanc*, from whence rises directly the *Pointe des Ecrins*.

This mountain, called also the Pic or Barre des Ecrins, the Pic des Arcines, and the Montagne d'Oursine, is the culminating point of the Dauphiné Alps. It was formerly confused with the Pelvoux, but its true geographical relations have now been determined by the engineers of the French Etat-major, and made known to English travellers through the labours of Mr. Tuckett. It is divided from the chain of the Pelvoux by the profound gorge which is occupied by the *Glacier Noir*, and is built up by the union of three ridges. The first of these, or *Crête de l'Encula*, extends from the summit in a north-easterly direction, and divides the upper snow basin of the *Glacier Blanc* (called by the French engineers the *Glacier de l'Encula*) from the *Glacier Noir*. The two other ridges run due N. and S., and separate the above-named glaciers from the head of the valley of La Bérarde, their lowest points being at the Col des Ecrins and the Col de la Tempe respectively. On the sides of the *Glacier Noir* and of La Bérarde, the faces of the mountain are extremely precipitous and quite inaccessible, but on that of the *Glacier Blanc* the slope is somewhat less steep, and, although laden with masses

of threatening seracs, will probably give access to the summit. In descending from the Col about 1 hr. suffices to reach the point where it is necessary to quit the glacier and continue the descent on the l. bank over steep slopes of débris alternating with snow and rock, in order to avoid the ice-fall between the upper plateau and the lower level of the *Glacier Blanc*. At the base of this slope, a few hundred feet from the glacier and hard by a spring of fresh water, is an overhanging rock, which has been turned to good account for a bivouac by Messrs. Tuckett and Mathews. Juniper bushes are not far off, which are available for fuel. The glacier, which now descends towards the SE., may here be crossed from the l. to the rt. bank, and this is easily effected in 20 min. The lower part of the *Glacier Blanc* is quite impracticable, and the descent continues over the rocky promontory at the base of the *Crête de l'Encula*. Rocks, steep but not difficult, and equally steep slopes of turf, lead down to the great moraine of the *Glacier Noir*. When this is passed, the traveller finds himself in a rock-strewn plain, nearly $1\frac{1}{2}$ m. long, torn by glacier torrents, called *Pré de Madame Carle*. When the glacier torrents are full, it is a matter of some difficulty to cross them in order to reach the l. bank. At its lower extremity this plain is barred by a huge mound (ancient moraine?) which must be surmounted, and then a descent of 1 hr. along the l. bank leads to the chalets of *Ailefroide*, which are reached by crossing the torrent of *St. Pierre*. $1\frac{3}{4}$ hr. leads from thence to *Ville Vallouise* (see *Rte. A*). Including the time lost in crossing the torrents, not less than $3\frac{1}{2}$ hrs. should be allowed from the foot of the glacier to *La Ville*.

There is some advantage in taking this pass from *La Bérarde*; the *Ecrins* remains more constantly in view; the ascent of the couloir on the W. of the Col would generally be preferred to the descent; and if found impracticable, it would be more convenient to return on

that side. On the other hand, the descent of the steep rocks above the lower ice-fall of the *Glacier Blanc* might give some trouble to a stranger, and it would be prudent to allow ample time, so as to avoid being benighted in some inconvenient position.

Mr. Tuckett was twice prevented by unfavourable weather from undertaking the ascent of the *Pointe des Ecrins*. The first attempt was made on 26th Aug., 1862, by Messrs. W. Mathews and Bonney, whose more successful achievements in other parts of the western Alps are frequently referred to in this volume.

Having bivouacked under the rock above mentioned, which is about 8,420 ft. above the sea, they started with J. B. and Michel Croz of Chamouni, ascending first along the l. bank, and then crossing the glacier to the base of the peak, about on a level with the Col des *Ecrins*. This was reached in $2\frac{1}{4}$ hrs. After climbing laboriously through soft snow for two hours, they attained the edge of a wide bergschrund which severs the snow slopes from the final peak. 12,936 ft. in height. The way to the summit, which lies 525 ft. higher, must be along the arête; but the snow was in too dangerous a condition to allow of the attempt being pushed further. The party accordingly retraced their steps, and crossed the Col du *Glacier Blanc* (*Rte. G*) to *La Grave*. The *Ecrins* has two distinct summits—the lower one, lying to N.W., 13,058 ft. in height; the other and principal peak, an irregular triangular pyramid with a double point. The higher of these (13,462') is seen to the l. from the *Glacier Blanc*, and the other point (13,396') appears to be no more than a projection from the northern arête.

ROUTE D.

LA BÉRARDE TO VALLOUISE, BY THE
COL DE LA TEMPE.

This pass is said to have been discovered by the younger Rodier, of La Bélarde (see Rte. A). It has been rarely traversed, and the only account of it in any English work is by Mr. Nichols, in the Second Series of 'Peaks, Passes, and Glaciers.'

As already stated, the main branch of the Venéon flows from the S. to La Bélarde, and there meeting the stream from the Vallon des Étançons, the united torrents turn to the E. through the valley of St. Christophe (Rte. A). The way to the Col de la Tempe lies along the S. branch, on the rt. bank of the stream. About 1 hr. from La Bélarde the valley of *Clochâtel* opens on the SW., and leads up to the *Glacier de Chardon*, also called *Baverja*, over which there is a pass into the Val Godemar (see Rte. F). Soon after passing this point and crossing a mass of detritus borne down by glacier torrents, the ascent commences up the steep side of a lateral valley that opens to the E., and leads up to the ridge connecting the Pointe des Écrins with the Pic d'Ailefroide. In 2 hrs. from La Bélarde the base of the first rocks is attained. It is necessary to climb for nearly $\frac{1}{2}$ hr. along a steep face of rock, and then to mount for 40 min. along the moraine, before reaching the *Glacier de la Tempe*. This is sufficiently steep and crevassed to require the usual companions of glacier travel—the rope and ice-axe; but there is no serious difficulty in the ascent, and in about $5\frac{1}{2}$ hrs. the summit of the Col is attained. This is a ridge of crumbling slate-rocks, probably about 11,000 ft. in height. S. of the Col is an eminence in the ridge, and beyond this a square gap, which Mr. Nichols reckons to be 500 ft. lower than the Col, but impracticable as a pass in consequence of the precipitous descent on the E. side. Save some of the Cottian Alps in the direction of

Mont Cenis, the view is limited to the surrounding peaks; but these present a variety and grand and fantastic forms.

The descent commences by some steep and rather difficult rocks to the rt., and then down a couloir, where large loose blocks in unstable equilibrium require to be passed with great caution. Nearly an hour is required before reaching the upper plateau of the *Glacier Noir*, just under the gap in the ridge above described. The upper basin of the glacier occupies a large part of the space between the peaks of the Écrins, Pelvoux, and Ailefroide, and its outlet is by a comparatively narrow ice-fall, passing at first E. and then SE. round the base of the Pelvoux. The N. side of this mountain, seen from the upper level of the glacier, is a very remarkable object. Between it and the Ailefroide is a gap, over which Mr. Tuckett thinks it may be possible to cross to the *Glacier du Selé*; but this has not yet been effected.

After crossing the upper plateau it becomes necessary to take to the rocks on the l. bank, and then to slopes of débris, returning to the glacier at a point where it receives a tributary glacier from the N. This is traversed, and the remainder of the descent lies over the lateral moraine until it attains the junction between the *Glacier Noir* and the *Glacier Blanc*, at the same point as in the last route. $3\frac{1}{2}$ hrs. are consumed in the descent from the Col to this point, and $3\frac{1}{2}$ hrs. more from hence to Ville Vallouise. (See Rte. C.)

ROUTE E.

LA BÉRARDE TO VALLOUISE, BY THE COL
DU SELÉ.

Although little less than 11,000 ft. in height, this is the easiest and most direct route from the W. to the E.

side of the Pelvoux group. It appears to have been formerly known to some of the native chasseurs; but the only certain information about it has been derived from Mr. Tuckett, who, with his two guides, also strangers to the district, has done more than any preceding traveller, native or foreign, to make known the high glacier passes of Dauphiné.

As in the Rte. to the last-described pass, on leaving La Bérarde the S. branch of the Venéon torrent is followed along its rt. bank, past the junction of the Vallon de Clochâtel (1 hr.) to its source at the foot of the *Glacier de la Pilatte*, or *Condamine* of Bourcet's map. After mounting for a short distance by the moraine of the rt. bank, the glacier may be followed for $\frac{1}{2}$ hr. until it approaches the point where its two principal branches meet. The W. branch, from the Col de Sais, and the S. branch, from the *Crête des Bœufs Rouges* (11,978'), descend in two ice-falls, which meet at the base of the Mont Giouberny. To reach the *Col du Selé* it is necessary to mount the steep slopes of débris and snow on the W. side of the S. branch. On gaining the upper plateau of the glacier, the course sweeps round the head of the glacier, aiming at a point nearly due E., where steep snow-slopes lead up to a ridge of rocks connected with the Pic d'Ailefroide, which from this side is a magnificent object. 2 hrs. suffice for the ascent from the foot of the glacier to the base of these slopes, and 1 hr. for the ascent from thence in zigzags up the snow, and then over the rocks to the Col. By Mr. Tuckett's observations, this is 10,834 ft. in height. A few hundred feet E. of the Col the traveller gains a magnificent view, especially of the Ailefroide and Pelvoux. Of the first, which is perhaps a few feet higher than the Pelvoux, Mr. Tuckett remarks:—'From the direction of the Glacier du Selé, I do not think the ascent of the Ailefroide would be impossible; but it might present considerable difficulties, as the fine

glaciers descending from it are remarkably precipitous and fearfully crevassed.' Between the Ailefroide and the Pelvoux is a very grand tooth or *aiguille* of bare rock, only about 130 ft. lower than the last-named peak: it appears to remain as yet unnamed.

Like the Col des Écrins, the *Col du Selé* is extremely steep on the W. side, while in the opposite direction it is level with the upper plateau of the *Glacier du Selé*—called *Seléon* in patois. There is no difficulty in following the upper part of the glacier, bearing somewhat to the rt., until the increasing width of the crevasses makes it necessary to cross to the l. hand moraine, $\frac{3}{4}$ hr. or 1 hr. from the top. The descent is at first by rocks, on which Mr. Tuckett found some traces of a path (chamois track?), and then down a huge pile of rough débris, leading in $\frac{3}{4}$ hr. to the Combe de Sapienière, a little below the foot of the glacier. From thence the châtelets of Ailefroide may be reached in $1\frac{1}{4}$ hr., and Vallouise in $1\frac{3}{4}$ hr. farther; the whole distance being accomplished in from 9 to $9\frac{1}{2}$ hrs.' steady walking, exclusive of halts.

ROUTE F.

LA BÉRARDE TO VALLOUISE, BY THE VAL GODEMAR—COL DE SAIS—COL DU CÉLAR.

This route requires two days, and involves the passage of two glacier Cols—neither of them, it is true, so high as those described in the preceding routes; but, except in settled weather, it is not to be recommended, as the traveller would risk a disagreeable detention in the Val Godemar, or else a very long circuit by the valley of the Drac.

The Cols hitherto described all lie across the eastern side of the great quadrangle which encloses the basin of

the Venéon. The *Col de Sais*, on the contrary, crosses the S. wall of that enclosure and leads into the Val Godemar, one of the tributary valleys of the Drac. It must be observed that besides the pass here described, there is another on the W. side of the Tête de Chéret—the *Col de Sais* of the French engineers. This is reached from La Bérarde by the *Vallon de Clochâtel* and the E. arm of the *Glacier de Chardon*. It is 10,168 ft. in height. To avoid confusion, we shall call this provisionally *Col de Chardon*.

The way to the true *Col de Sais* follows the course described in the last Rte. as far as the *Glacier de la Pilatte*, where, as already mentioned, two principal affluents descend in ice-cataracts from either side of the Mont Gioubernny. To avoid the western ice-fall, which descends from the *Col de Sais*, it is necessary to bear away to the rt. and mount the steep slopes of the Tête de Chéret, on the l. bank of the glacier. After a considerable ascent over crystalline rocks overlaid by slate, the traveller will find himself on a level with the upper and less precipitous slope of the glacier, which leads up in a direction somewhat W. of S. to the summit of the *Col*, about $4\frac{1}{2}$ hrs. from La Bérarde, 10,224 ft. in height (Forbes), or 10,289 ft. (French engineers)

The most striking object in view from the *Col* is the *Pic d'Ailefroide*, whose W. side is a massive pinnacle of inaccessible rock, too steep to give lodgement to snow. Nearer to the *Col*, and about 700' higher, is the Mont Gioubernny. According to Mr. Bonney, the snow-ridge leading up to it presents no apparent difficulty.

The descent into the Val Godemar, overpartially disintegrated talcose rocks, is extremely steep, and might even be dangerous in bad weather. It is also much longer than the ascent on the N. side. About 3 hrs. are required for the descent to *Clot*, the highest hamlet in Val Godemar; but if the traveller should not be independent of local supplies, it will be necessary to de-

scend to the village of *La Chapelle*, nearly 2 hrs.' walk down the valley. Professor Forbes was well received here by the *curé*.

To reach Vallouise from *La Chapelle* it is necessary to return to *Clot*, a distance of 2 hrs. The ascent from thence to the *Col du Célar*, or Sellar, lies for a long way over rough moraine, and for the last hour over glacier. Meeting a good deal of fresh snow, Professor Forbes took $3\frac{1}{2}$ hrs. in the ascent from *Clot* to the *Col*, a mere ridge of shattered granite, 10,092 ft. in height. The descent on the E. side over precipitous granitic rocks seamed with veins of green felspar is difficult, and not to be attempted in bad weather. The *Pic Bonvoisin*, also called Garroux (11,503'), on the S. side of the *Col*, is an imposing object. The first châteaux are met at *Entraigues*, and from thence to Vallouise is a walk of 2 hrs.

ROUTE G.

VALLOUISE TO LA GRAVE EN OISANS— COL DU GLACIER BLANC.

A glacier pass of the grandest character, discovered by Mr. Tuckett, July 16, 1862. The possible difficulties on the N. side are so serious, that it should be attempted only by thoroughly practised mountaineers, and none but first-rate men should be taken as guides. Mr. Tuckett counts 10 hrs. 40 min. of fast walking from Ville Vallouise; but it is far more advisable to pass the night at Ailefroide, or even at the much higher station near the Glacier Blanc, where he bivouacked with his guides.

The S. side of the pass is reached by the same course as that taken between Vallouise and the *Col des Écrins*, so far as the steep ascent from the middle to the upper plateau of the Glacier Blanc (see Rte. C). The overhanging rock where

Mr. Tuckett slept may be reached in $5\frac{1}{2}$ hrs. from Ville Vallouise. From thence also the ascent for $\frac{3}{4}$ hr. is the same as if the object were to reach the upper plateau of the Glacier Blanc, but when about $\frac{1}{4}$ hr. from the plateau, it is necessary to turn to the N. and ascend by a rather steep lateral glacier, which leads in $\frac{3}{4}$ hr. to the Col. By a mean between the measurements of Messrs. Tuckett and Mathews, this is 10,811 ft. in height, lying between the *Pic de Neige* (11,861') on the E. and a summit marked on the French map, *Pic Signalé*, (12,008'), lying at an equal distance to the W. The view, to the S. and SW. includes the peaks of Écrins, Ailefroide, and Pelvoux, and their glaciers, but that on the N. side is still more striking. The *Glacier d'Arsine* is seen at a prodigious depth below, and separated from the Col by precipices of formidable steepness. Mr. Tuckett was fortunate enough to hit upon the precise point from whence alone the descent seems possible, though far from easy. The rocks there project in the form of a very steep buttress, and are in highly shattered condition, so that the utmost care is needed to avoid detaching loose blocks, which would endanger the traveller himself or his companions. At the base of the cliffs a slope of névé leads down to the glacier, which may be reached in $1\frac{1}{4}$ hr. from the Col. The descent on the glacier d'Arsine presents no difficulty, and, keeping somewhat to the l., 20 min. suffice to reach the W. moraine, which is developed on a great scale, exhibiting three parallel ridges corresponding to former variations in the size of the glacier.

The *Glacier d'Arsine* exhibits the unusual phenomenon of a double outlet, sending down one torrent to the NE., which joins the Guisanne a little above Monestier, while on the NW. it is the source of one branch of the Romanche.

From the lower end of the glacier a rapid slope leads in $\frac{1}{4}$ hr. to the pastures at the head of the valley, from whence it is a pleasant walk of $\frac{1}{2}$ hr. to the Châlets de l'Alpe, leaving on the rt. the path which mounts to the E. to the *Col d'Ar-*

sine, leading from La Grave to Monestier. From the châtelets $1\frac{1}{2}$ hr. takes the traveller by a good path to Villard d'Arène, and $\frac{1}{2}$ hr. farther by the high road is La Grave en Oisans (see § 8, Rte. A). [This pass was effected for the second time by Messrs. W. Mathews and Bonney, on Aug. 26, 1862. At that season the passage from the rocks below the Col to the glacier presented serious difficulties, and they consumed more than 6 hrs. in reaching La Grave from the summit.]

It would probably be equally easy, and rather shorter, to descend from the Glacier d'Arsine into the valley which leads to Monestier, where the accommodation is far superior to that at La Grave.

ROUTE H.

VALLOUISE TO MONESTIER—COL DE L'ECHAUDA.

This is an easy and comparatively frequented pass, practicable for mules. The track from Ville Vallouise diverges from the main valley of the Gyr at the hamlet of Claux, 1 hr. distant, and mounting over green pastures reaches, in about 2 hrs. farther, the scattered châtelets of *Echauda*. From thence the ascent continues on the E. side of the valley, keeping to the rt. of some precipitous rocks that appear to bar the passage. Above this is a green basin surrounded by rocky summits, at the N. end of which is the summit of the Col, $1\frac{3}{4}$ hr. from Echauda. The descent to Monestier is free from difficulty, and may be easily accomplished in 2 hrs.—in all, about $6\frac{3}{4}$ hrs.' walking from Vallouise.

ROUTE I.

LA GRAVE EN OISANS TO ST. CHRISTOPHE
— COL DE LA SELLE.

An account of this pass is given in the Second Series of 'Peaks, Passes, and Glaciers,' by Mr. F. Elliot Blackstone, who crossed it in 1855 with a friend, and a chasseur, who was recommended as guide by the innkeeper at La Grave, and proved himself to be a good mountaineer.

After passing the Romanche, a path leads up the steep slopes below the glaciers of the Aiguille du Midi, bearing gradually to the rt. Before reaching the snow-fields it is necessary to climb some high and steep rocks, resembling those of the Hörnli, above Zermatt. The summit is a ridge overlooking a glacier of very pure ice, which slopes away to the rt. towards the Combe de Malval. Following the ridge, the névé was soon reached, and this being covered with fresh snow, 2 hrs. were consumed in reaching the Col. The view from hence seems to be extensive and interesting. To judge from the description and ground-plan given in the account above cited, the pass probably lies immediately to the W. of the *Rateau* (12,317'). A few paces below the Col on the N. side you reach the edge of a vast semi-circular hollow, overlooking at a great depth below the *Glacier de la Selle*. The descent over the slippery slopes on this side requires caution, and when coated with hard snow should not be attempted without the rope and ice-axe. For want of these needful implements, Mr. Blackstone's companion narrowly escaped destruction. Lower down the descent is over rocks, steep but not very difficult. After gaining the valley below, a rough path leads along the stream, called Torrent du Diable, to St. Christophe. 'A good pedestrian ought to cross the pass in 10½ hours.'—[F. E. B.]

The attention of future explorers is called to the glaciers at the head of the Vallon de la Selle. Either from this

side, or from the Glacier des Étançons, it may be possible to reach the summit of the *Meije*, or *Aiguille du Midi de la Grave* (13,081'), the second in height of the Pelvoux group.

ROUTE K.

VALLOUISE TO EMBRUN, BY THE VALLEYS
OF THE HAUTES ALPES.

To the S. of the central group of the Pelvoux a considerable group of high mountains, chiefly composed of eocene rocks, extends between the rivers Drac and Durance. No one peak rises much above its fellows, but the short ridges, which usually tend to a direction from W. to E., include many summits that range from 10,000 to 11,000 ft. In regard to this neglected district, the editor has procured little information beyond some brief notes of an excursion made by Mr. A. P. Whately in 1854.

From the village of *Puy St. Vincent*, less than 2 m. S. of Vallouise, a path leads SW. to the hamlet of *Narreyroux*, and from thence by the *Col de Bal* to the Bergerie de Haut Martin, 5½ hrs. from Ville Vallouise. The view from the Col, with the precipices of Arpec in front and the Viso in the distance, is extremely fine. The Bergerie is probably the same as laid down in the French military map as Cabane des Ayes.

From the Bergerie a track mounts nearly due W. along the *Fournel* torrent to the *Col de Haut Martin*, or d'Argentière, and descends into the Val Rognons, which forms the upper end of the *Val Champoléon*. From thence another ascent leads by the *Col de Prelles* into the Vallon de Prelles, and a third and steeper pass—the *Col d'Orcières*—must be traversed to reach L'Eglise, where there is a tolerable inn, chez Rogier. Time, from the Bergerie

to L'Eglise, $8\frac{1}{2}$ hrs.' walking. The place called L'Eglise by Mr. Whately is apparently the village of *Orcières*, laid down on the military map.

It will be observed the two last-mentioned passes lie on the W. side of the watershed, and it would be easy to descend in that direction to the valley of the Drac. Should the traveller desire to return to the valley of the Durance, he may ascend in 4 hrs. by *Prapic* to the *Col des Tourettes* (8,465'), so called from two singular limestone pillars at the summit. The SE. side of the pass leads down to the valley of Chateauroux, where are seen pinnacles of friable limestone surmounted by boulders similar to those in the Val de Molines (§ 4, Rte. D). About 4 hrs. are required for the descent from the Col to the village of *Chateauroux*, on the high road from Embrun to Mont Dauphin, about 1 hr. walking from the former and $2\frac{1}{4}$ hrs. from the latter place.

The preceding excursion might be varied by combining with it a visit to the *Val Freissinières*, a valley still wilder and more desolate than those above noticed, and interesting as one of the scenes of Felix Neff's labours. This is divided from the Val de Haut Martin by the lofty ridge of *Dormillouse*, whose highest point attains 10,571 ft. The valley is most easily accessible from the valley of the Durance. Opposite the village of *La Roche*, 6 or 7 m. N. of Mont Dauphin, a long wooden bridge crosses the Durance, and from thence a path mounts rather steeply to the hamlet of Pallon, crosses the *Biaissee* torrent which drains the valley, and farther on returns to the l. bank to the village of *Freissinières*, 1 hr. from the bridge, surrounded by orchards and corn fields. 1 hr. farther is *Les Viollins*, which contains a Protestant church built by Neff. About $1\frac{1}{2}$ hr. higher up is the last hamlet, called *Dormillouse*, a group of miserable hovels not far from the foot of the glaciers, where the poverty-stricken natives dwell in the same sheds with their cattle. There

are doubtless passes to the W. leading from hence to Champoléon or Orcières, but the editor has not received information about them.

ROUTE L.

BOURG D'OISANS TO GRENOBLE, BY LA MURE.

By the Col d'Ornon $49\frac{1}{2}$ Eng. m. By Lavalens
about 48 m.

The group of high Alps described in this section is most frequently approached from the valleys of the Romanche or the Durance, but it sends a considerable portion of its waters to the sea through the Drac, which forms its SW. limit. The most convenient point in the valley of the Drac for exploring the higher Alpine valleys on that side of the group is La Mure, which is on the high road from Gap to Grenoble, daily traversed by diligences, and easily reached from Bourg d'Oisans by either of the routes here described. To a traveller bound from the Bourg for Grenoble the detour by La Mure offers the inducement of more varied and picturesque scenery, but would involve an additional day, unless he should engage a vehicle from Entraignes to La Mure, and from the latter town to Grenoble.

The direct way from Bourg d'Oisans to La Mure is by the valley of the *Lignare* torrent, which joins the Romanche about 2 m. below the Bourg. The upper portion of this valley belongs to the commune of *Ornon*, which, as commonly happens in Dauphiné, includes a number of scattered hamlets. About $1\frac{1}{2}$ hr. from the Bourg on the l. bank of the Lignare is *Palus*, the lowest of these hamlets; several others, including the principal hamlet, are seen perched upon eminences, in picturesque positions,

overlooking the valley. From hence the summit of the Taillefer (§ 8, Rte. A) may be attained, but a guide is required. In $\frac{3}{4}$ hr. from Palus the traveller reaches the *Col d'Ornon* (4,380'), a low pass between two peaks about 8,500 ft. in height. On the S. side of the Col, the path descends through the valley of the *Malsanne*, much wilder than that of the *Lignare*. About $2\frac{3}{4}$ hrs. suffice to reach the village of *Entraigues*, where there is an inn. This derives its name from the junction of the *Malsanne* with the *Bonne*, issuing from the *Val Joffrey*. A good carriage road leads from hence to La Mure, $11\frac{1}{2}$ m. Under the bridge by which it crosses the *Bonne* 500 yards above the junction of the two streams, the torrent forms a fine waterfall. 3 m. below *Entraigues* is *Valbonnais*, picturesquely placed on the rt. bank of the *Bonne*, and somewhat lower down the road returns to the l. bank, and winds at a great height above the stream along the channelled slopes which have eaten into vast deposits of gravel and detritus that at some period filled a great portion of the valley. 5 m. below *Valbonnais* the road joins the high road from *Grenoble* to *Gap*, close to the *Pont Haut*, a bridge over the united streams of the *Bonne* and the *Roisonne*. Just below their junction the bridge is crossed, and a rather long ascent towards the NE. is required to reach La Mure. The new road winds in long zigzags for a distance of 3 m., but pedestrians prefer the old road, which in $1\frac{1}{2}$ m. reaches

La Mure (Inn: *Hôtel Pelloux*), a small town of 3,000 inhabitants, famous for the resistance made by its Huguenot population, when besieged, in 1580, by the Duke of Mayenne. Built on a plateau 2,860 ft. above the sea, the climate in winter is very severe. The distance by the high-road from La Mure to *Grenoble* is 38 kil. = $23\frac{1}{2}$ m. Before reaching *Pierre Châtel*, the road passes near some of the works connected with the anthracite mines, which are here worked on a great scale, the consumption having enormously increased of late years.

[A few miles to the W. of the high road is *La Motte les Bains*, a watering-place chiefly frequented by rheumatic and scrofulous patients. Excepting one inn, called *Hôtel du Bois*, all the accommodation is under the single roof of the *établissement*, where 300 persons find beds, besides baths, salons, dining-rooms, reading-rooms, &c. The scenery of the neighbourhood is agreeable, but scarcely equal to that of *Uriage* or *Allevard*.]

About 8 m. from La Mure is *Laffrey*, a small village, with an inn, and a church built by the *Templars*, commanding a very extensive view. It stands on the highest part of an extensive plateau, more than 3,000 ft. in height, on which are four lakes, the largest about 2 m. long and $\frac{1}{2}$ m. broad. Here was the first meeting of *Napoleon* on his return from *Elba* with the royal troops. From *Laffrey* to *Vizille* the road descends constantly for 5 m. a height of more than 2,000 ft. *Vizille* to *Grenoble*—see § 8, Rte. A.

The preceding Rte. may be varied by taking a different and rather more interesting course from *Ornon* to La Mure. Instead of crossing the *Col d'Ornon*, another path, which keeps to the rt. from the hamlet of *Rivier*, follows the stream of the *Lignare* to a pass called *Clot Beaumont*, and in 4 hrs. from *Bourg* reaches the highest hamlet in the valley of the *Roisonne*, called *Moulin Vieux*. $\frac{1}{2}$ hr. farther is *Laval-dens*, and 1 hr. beyond this *La Valette*, the principal villages in the valley of the *Roisonne*. Serpentine and crystalline rocks of varied composition are found in this valley, as well as metallic ores, which cannot be worked to advantage in consequence of the difficulty of access. A rough road leads in 2 hrs. from *La Valette* to La Mure; $7\frac{1}{2}$ hrs. from *Bourg d'Oisans* by this Rte.

A pedestrian might easily reach *Laffrey* from *Bourg* in 8 hrs.' walk by following the Rte. last described so far as *Moulin Vieux*, 4 hrs. From thence a path crosses a low *Col* (4,422') to *La Morte* in 1 hr., and *Laffrey* is then

reached in $2\frac{1}{2}$ or 3 hrs., passing the hamlet of Le Désert, and following a ridge which overhangs the gorge of Sechilienne in the valley of the Romanche.

ROUTE M.

LA MURE TO LA CHAPELLE IN VAL GODEMAR.

$8\frac{1}{2}$ hrs.' walk by the Col de la Vaurze.

By this Rte. the highest summits of the Pelvoux group may be approached from the valley of the Drac. Entraigues is reached by a good road from La Mure in $11\frac{1}{2}$ m. (see last Rte.). Instead of following the Malsanne torrent, a rough carriage-road follows the l. bank of the *Bonne*, passing Gragnolet until it crosses to the rt. bank opposite to *La Chapelle*, the chief village of *Valjouffrey*, 1 hr. 20 min. from Entraigues. Here is the junction of the torrent from *Valsenestre* with the *Bonne*. [Two passes lead from Valsenestre to the valley of the Venéon. One by the Col de la Muzelle to Venos is mentioned in Rte. A. The other, more difficult and little used, leads by the *Brèche de Valsenestre* (8,642') to the valley of Lovitel. The lake of the same name which is passed in descending towards the Venéon is considered the finest in Dauphiné, and

is renowned for its trout. A boat kept by a fisherman will save the pedestrian a troublesome detour by ferrying him across the lake.]

The way from *La Chapelle* to *Val Godemar* follows the rt. bank of the *Bonne*, crossing to the l. bank near *Les Clarets*. By this hamlet is the narrow opening of a gorge, through which a path leads over the *Col de Menoux* to *St. Maurice* in *Val Godemar*. A more direct path returns to the rt. bank of the *Bonne*, to which it adheres till it reaches the highest hamlet, called *Le Désert* (4,216'). $2\frac{3}{4}$ hrs. from *Entraigues*. Here the track quits the *Bonne*, and in 1 hr. mounts by the lateral glen of the *Echarenne* in a SE. direction to the *Col de la Vaurze*. The descent is steep but not difficult, and in another hour the *Val Godemar* is reached at the hamlet of *Villard Loubières*. Less than 1 hr. suffices from thence to reach *La Chapelle en Val Godemar*.

Another and much more difficult way from *Le Désert* follows the torrent of the *Bonne*, first to the NE. and then to SE., till near its source in the glaciers of the *Pic d'Olan* (11,739'). Between this and the *Pic de Turbat* (9,941') is a rarely-used pass, called *Col de Turbat* (9,800'?), from whence the descent along the *Clot* torrent leads to the *Val Godemar*, a few hundred yards above *La Chapelle*. 'Time from *Le Désert* to *La Chapelle*, 4 hrs.' [*Joanne*]. From *La Chapelle* the traveller may reach *La Bérarde* by the *Col de Sais*, or *Val-louise* by the *Col du Célar*. (See Rte. F.)

CHAPTER IV.

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FROM the Roche Melon to Mont Blanc the main chain of the Alps, dividing the waters which flow to the Adriatic from those which are poured into the Mediterranean through the Rhone, runs in a tolerably direct line from S. to N. for about 42 Eng. miles. On the E. side of the watershed a very lofty group fills the space between the Dora Riparia and the Dora Baltea. In the opposite direction a still more extensive, though less elevated, mountain

region includes the greater part of Savoy, and throws out some considerable outlying ranges into the neighbouring departments of France. Some geographers have included both these groups under the general designation of Graian Alps. It appears, however, more convenient and in accordance with ancient usage to reserve that denomination for the eastern group. The other, which we shall call the South Savoy Alps, bear to the Graians a

relation somewhat analogous to that between the Dauphiné and the Cottian Alps, with this additional ground for distinction—that whereas the Graian Alps proper are composed almost exclusively of crystalline slate, these are scarcely anywhere seen in the higher ranges of South Savoy, where comparatively little altered sedimentary rocks have been carried to the summit of the highest peaks.

The principal group of the South Savoy Alps, nearly all appertaining to the province of Tarentaise, is completely enclosed between the Isère and the Arc. N. and W. of the junction between those rivers are a number of parallel ridges of limestone with intervening valleys broken through by a broad depression, where stands Chambéry, the ancient capital of Savoy. Though of no great height, the scenery of this latter district, and especially of the ranges S. of Chambéry, which enclose the famous monastery of the Grande Chartreuse, has obtained just celebrity. N. of the Isère, and between Mont Blanc and Annecy, a considerable tract of mountain country extends towards the valley of the Arve. This, which we shall call the Albertville district, from the name of its chief town, is proposed rather with a view to convenience in the arrangement of this work than as corresponding to a region orographically distinct. (See § 12.)

With the exception of the main valleys, which are for the most part traversed by carriage-roads, the Alps described in this chapter have been very little visited by English tourists. The scenery of the Tarentaise is doubtless inferior in grandeur to that of the adjoining Pennine chain, or the High Alps of Dauphiné; yet there is no want of snow-clad peaks and glaciers to tempt the aspiring mountaineer, while among the lower ranges W. of the Isère many excursions full of novelty and interest are open to those who prefer to avoid risk and fatigue. The accommodation usually available to a traveller in South Savoy is de-

cidedly superior to that of Dauphiné, but usually deficient in cleanliness. The worst quarters are found in the upper valley of the Isère, where, as not seldom happens, the absence of all decent provision for their comfort is accompanied by a strong desire to prey upon the purses of strangers.

SECTION 10.

CHAMBÉRY DISTRICT—GRANDE CHARTREUSE.

A LINE drawn from SSW. to NNE., between Grenoble and Sallanches, through the valley of the Isère and that of its affluent the Arly, marks a boundary which appears to have much significance in the orography of this part of the Alpine chain. W. of that line, many parallel ridges of limestone, rarely attaining 7,000 Eng. feet in height, form a series of deep trenches, which are cut through, but not at rt. angles, by three parallel valleys. These are the valley of Chambéry, that of the Chéran, and the still deeper hollow which is occupied by the Lake of Annecy and the valley of the Eau Morte. Although there are clear indications that the forces which have given their direction to these western ridges have also operated on the adjoining groups of the Tarentaise and Oisans, it would appear that there is a still closer relation between the former and the chain of the Jura, whose SW. extremity is in the adjoining department of the Ain.

In the Chambéry district we include the greater part of the region here defined, excluding only the portion NE. of the Lake of Annecy and the path which, after passing Faverges and the Col de Tamié, joins the Isère at Cléry Frontenex, this being more conveniently placed in the Albertville district. As thus limited, this district includes three groups—the Beauges,

lying between Chambéry and the Lake of Annecy; the Grande Chartreuse group, extending from Chambéry to the bend of the Isère below Grenoble; and the range of the Mont du Chat, W. of the Lac de Bourget. The valley of the Isère, between Grenoble and Montmélian, known in Dauphiné by the name of Graisivaudan, along with the minor valleys which intervene between it and the chain of the Belledonne, are also included in this district. The baths of Allevard and Uriage both offer desirable head-quarters for a mountaineer, while the entire district abounds in agreeable scenery, easily accessible to ladies, and even to invalids.

ROUTE A.

PARIS TO CHAMBÉRY — LAKE OF BOURGET.

Railway in 14 h. 24 min. by Express train,
596 kilomètres=370½ Eng. miles.

There is but one direct train daily from Paris to Chambéry. This is the night express (carrying first-class passengers only), which leaves Paris at 8 P.M.; reaches Macon at 5.45 A.M., and Chambéry at 10.50 A.M. A so-called omnibus train, carrying 1st, 2nd, and 3rd class passengers, leaves Paris at 10.40 P.M., halts at Macon next day from 12.50 to 3.5 P.M., and reaches Chambéry at 8.40 P.M., thus employing 22 hrs.

Travellers who do not wish to travel by night may take the morning express from Paris at 11.5 A.M., which reaches Macon at 8.31 P.M., and proceed on their journey at 5.20 A.M. next morning.

The main line of the railway from Paris to Lyons and Marseilles is followed as far as

Macon (Inns: Europe, good; Champs Elysées; Sauvage). Here the line to Geneva and Chambéry leaves the Lyons rly., which is carried along the rt. bank of the Saône, and, after crossing

that river, traverses the Department of the Ain, passes *Bourg*, its chief town, close to which is the famous church of *Brou*, one of the finest monuments of the later Gothic architecture in France, and at the station of *Ambérieux* meets the rly. from Lyons to Geneva. Three trains usually meet at this station; and as their direction is reversed, mistakes are frequently made, to the serious inconvenience of travellers, who should ascertain by enquiry that they are placed in the right train for their destination. Between *Ambérieux* and *Culoz* the rly. passes through the last ramifications of the chain of the Jura mountains, and in approaching the latter station winds round the S. base of the *Mont Colombier* (4,733'). From the summit, easily reached in 4 hrs. from the rly. stations of *Culoz* or *Artemart*, there is an admirable view of the Savoy Alps, with the lakes of Bourget, Annecy, and Geneva, while on the side of France it extends to Lyons and the mountains of the Ardèche. At *Culoz*, where there is a good refreshment room, the rly. to Geneva turns nearly due N., ascending the valley of the Rhone; while the Chambéry line crosses that river on a long bridge, and is then carried SE. across the marshy tract that separates the river from the Lake of Bourget.

It is here apparent that within a period geologically very recent, and perhaps since this region was inhabited by man, the waters of the Lake of Bourget extended over a large area on either side of the Rhone; while in the opposite direction they reached to Chambéry, and perhaps even to the valley of the Isère. At about 4 m. from *Culoz* the rly. attains the N. shore of the lake, close to the village and castle of *Châtillon*. From thence to *Aix les Bains* it is carried along the E. side of the lake, passing by four tunnels under as many rocky promontories, but for the greater part of the distance commanding very beautiful views of the lake and the range of the Mont du Chat. At about 12 m. from *Culoz*

a short branch line turns off to the l., and in $1\frac{1}{4}$ m. reaches

Aix les Bains, one of the most frequented and agreeable watering-places on the continent. All the principal houses are either hotels or *pensions*. The following are considered first-class hotels: H. Venat—rather dear; H. Guiland; H. Royal; H. des Princes; H. Jeandet; H. de l'Univers. There are a multitude of *pensions* where a single man may find board and lodging at about 5 frs. per day. The Café Dardel is recommended for breakfasts. The charges for carriages, horses, donkeys, and boats are regulated by tariff, and will be found in all the hotels.

The mineral waters of Aix have been known for at least 18 centuries, and are now frequented by about 6,000 patients annually, without counting the neighbouring country people. The position of the place, amidst the undulating and richly-cultivated slopes that intervene between the Beauges mountains and the lake of Bourget, is too low and too warm to suit a mountaineer, but offers to those who use the waters a variety of interesting excursions, for the most part very easy of access. One of the best points for a view over the lake and the surrounding country is the Revars (5,112'), one of the summits of the ridge called *Mont d'Azy*, which bounds on the E. side the plain of Aix. This may be easily reached by the village of *Mouxy* in about 3 hrs. The descent need not occupy more than 2 hrs. The chief natural attraction of which Aix can boast is, however, the neighbourhood of the beautiful lake of Bourget, which may well vie with many others of greater celebrity. Reduced to less than half its original dimensions by the detritus carried down by the Rhone at the north, and the Laisse at its southern extremity, it is at present about 10 m. in length, with an average breadth of fully 2 miles. The W. side is bounded by the long and steep ridge of the *Mont du Chat*, which is the connecting link between the outer ranges of the Savoy Alps and the chain of the

Jura. The height of this very uniform ridge exceeds 3,500 Eng. feet, but opposite to Aix is a depression—the *Col du Mont du Chat*—not more than 2,070 ft. in height, and immediately to the S. a bold craggy peak—the *Dent du Chat*—the Righi of this part of Savoy, vying with that famous mountain in the extent of its panorama, but not comparable for the exquisite combination of all the elements of Alpine scenery in which the Righi remains unsurpassed. There is this further difference, that whereas the Swiss mountain is easily accessible on every side, and is covered with places of entertainment for strangers, the *Dent du Chat* is decidedly difficult of attainment by all but practised cragsmen, the path on the upper part being scarcely traced. The usual course is to cross the lake to the little village of *Bordeau*, whence the summit may be reached in 3 hrs. 15 min. suffice to reach the high-road from Chambéry to Yenne, which mounts in long zigzags to the Col. An easy ascent leads in $\frac{3}{4}$ hr. to the summit level, a little above the hamlet of Grateloup. The view from the Col is very extensive, and will well reward those who cannot achieve the remainder of the ascent. To reach the peak of the *Dent du Chat* it is necessary to descend along the high-road for about 15 min. on the slope towards Yenne (Rte. G), and then turn to the l. along a path which leads in 20 min. to a little country inn. Here the steeper part of the climb commences; the way, which is but faintly traced, lies in turn amidst trees, up steep slopes of débris, and over rocks, till in $\frac{3}{4}$ hr. from the inn the ridge of the mountain overlooking the Col is attained. This is followed for $\frac{1}{2}$ hr. to the base of the highest peak, or *tooth* of rock, which from a distance appears quite inaccessible. On the E. side, overlooking the lake, the rocks form a rough staircase, by which the summit (5,302') is gained without any real difficulty. The descent need not occupy more than 2 hrs.

Among other excursions to be made from Aix, that to the Abbey of *Haute Combe* should not be omitted. This stands on the steep W. shore of the lake, about 5 m. N. of Aix. Founded in 1125, it was for many centuries the burial place of the princes of the house of Savoy. The present building is a modern restoration, executed with questionable taste, but many of the tombs are interesting and deserve notice as works of art.

The distance from Aix to Chambéry by rly. is about 10 Eng. miles. The approach to the capital of Savoy through the broad valley which separates the mountains of the Grande Chartreuse from those of Beauges abounds with fine points of view. Belonging to the former group are the Mont Grelle (4,649') SW., and the Mont Granier (6,348') due S., while to the NE. the *Dent de Nivolet* (4,597'), an advanced bastion of the Beauges, presents a very bold front.

[This summit, marked by a large wooden cross, is easily reached in 4 hrs from Chambéry, following the carriage-road to Châtelard (Rte. I) as far as Désert, and thence ascending the E. slope of the mountain. The direct way from Chambéry is very steep. The view is not equal to that from the Dent du Chat.]

Chambéry (Inns : H. de France; H. de l'Europe—both good ; Petit Paris, near the diligence office) is a small city of cheerful aspect, now reduced from its rank as capital of Savoy to that of chief town of a department and residence of a prefect. The slopes of the hills in the neighbourhood, covered with villas and gardens, give an air of wealth and importance to which the interior of the city scarcely corresponds. Of the numerous excursions to be made in the neighbourhood the most frequented is to Les Charmettes, well known to the readers of the 'Confessions' of J.-J. Rousseau, about $\frac{1}{2}$ hr. walk from the city. The house and garden have been kept nearly in the same state since his time. To the lover of nature

a more interesting walk is that to the Bout du Monde, at the base of the Dent de Nivolet, reached in 1 hr. by either bank of the Laisse torrent ; the path turns aside towards the N. at the opening of the gorge of the Doria, a stream which descends through a cleft between the Dent de Nivolet and the Chaffardon.

A somewhat longer expedition is that to the *Abîmes de Myans*, most easily reached from the first station on the rly. to Modane, called Route de Grenoble. Several small lakes lying in the midst of a number of conical hillocks have attracted the attention of geologists ever since the time of Saussure. It appears certain that both the lakes and the hillocks owe their origin to a great berg-fall from the neighbouring peak of the Mont Granier. That mountain is noticed in Rte. B.

ROUTE B.

GRENOBLE TO CHAMBÉRY, BY THE RIGHT BANK OF THE ISÈRE—MONT GRANIER.

	Kilomètres	Eng. miles
St. Ismier . .	11	7
Lumbin . .	9	5 $\frac{1}{2}$
Le Touvet . .	7	4 $\frac{1}{2}$
Barraux . .	9	5 $\frac{1}{2}$
Chapareillan . .	4	2 $\frac{1}{2}$
Les Marches . .	5	3
Chambéry . .	11	7
	<hr/> 56	<hr/> 34 $\frac{3}{4}$

The direct way from Grenoble to Chambéry lies through the beautiful valley of the Isère as far as Montmélian. A railway is in progress which will be carried from the latter town along the l. bank of the river. There are high-roads traversed by diligences along both banks, but the post-road is on the rt. bank. Either road offers attractions in point of scenery, but that of the rt. bank commands the finest views of the neighbouring Alps.

The road leaves Grenoble by the Porte St. Laurent on the N. side of the river, and winds along the base of the

Mont St. Eynard, a long ridge which encloses the valley on this side, and is frequently visited by the botanists of the neighbourhood. After passing *Montbonnot*, a picturesque village surmounted by a ruined castle, the range of the *Belledonne* comes well into view to the E., and is the most striking object in the fine panorama which is almost everywhere discovered in this part of the valley of *Graisivaudan*. 2 m. beyond *Montbonnot* is *St. Ismier*, a village at the foot of the highest part of the *Mont St. Eynard* (4,846'). [A rough foot-path mounts from the village towards the N. and leads to the *Grande Chartreuse* in about 5 hrs. (?) Another path, practicable for mules, and more interesting, leaves the high-road about 1 m. beyond *St. Ismier*, after it has traversed the torrent of *Manival*. The track mounts for $\frac{1}{2}$ hr. by the l. bank of that torrent through a fine gorge, and then ascends by zigzags to the ridge on the E. side, which forms the edge of a plateau crowned by the *Dent de Crolles*. The way now keeps to the N. towards a pass, called by *Joanne* *Col de Manival*, and descends from thence to *St. Pierre de Chartreuse*. By this way the *Grande Chartreuse* may be reached in less than 5 hrs. from the high-road. A third track leaves the road at the village of *Bernin*, about 2 m. farther from *Grenoble*, and after passing *Craponnoz* ascends to *St. Pancrace*, meeting the last route to the N. of the *Col de Manival*. An active pedestrian taking a light carriage from *Grenoble* may reach the *Chartreuse* in less time by any one of the above paths than by the more frequented route by *Sappey*.]

Bernin, $9\frac{3}{4}$ m. from *Grenoble*, stands beside a stream of the same name, which, when full, forms, near *Craponnoz*, one of the most picturesque waterfalls in *Dauphiné*. N. of the village is the *Dent de Crolles*, or *Petit Som* (6,778), one of the highest summits in the range W. of the *Isère*. About 3 m. farther is *Lumbin*, a post-station, and several other small villages and hamlets are passed before reaching *Le Touvet* (H.

de la Poste), a large village, near to which is a suspension bridge over the *Isère*. The ridge to the E., called *Haut du Seuil*, commands a magnificent view of the valley of *Graisivaudan* and the ranges of the *Dauphiné Alps*. Near the summit is a very curious amphitheatre of rock, resembling on a small scale the *cirques* of the *Pyrenees*.

3 m. beyond *Le Touvet* (20 m. from *Grenoble*) is *La Buissière*, at the foot of the ridge of the *Alpette* (6,040'), a portion of the almost continuous range which extends from the *Mt. St. Eynard* to the *Mont Granier*, and which everywhere commands noble views of the *High Alps*. Across this range lies a track leading by *St. Pierre d'Entremont* to *Les Échelles* (Rte. F). Less than a mile beyond *La Buissière* the new road to *Chambéry* turns to the rt., passing between the *Fort of Barraux* and the *Isère*. The *Fort* stands on a rock 430 ft. above the river, and separated from the village of the same name, standing on the lower slopes of the *Alpette*, by a little *col* or saddle over which the old road was carried. A third way, recommended to pedestrians, passes to the l. of the old road through the picturesque village of *Barraux*. The three roads unite about 4 m. farther on, passing a few hundred yards to the rt. of the village of *Chapareillan*, which stands near the foot of the *Mont Granier*.

[Of all the mountain excursions in the outer ranges of the *Savoy Alps* there is none, excepting perhaps that of the *Mont du Chat* (Rte. A), so interesting and agreeable as the ascent of the *Mont Granier*. From 4 to $4\frac{1}{2}$ hrs. are requisite for the ascent, and about 3 hrs. for the return to *Chapareillan*. Although not more than 6,348 ft. above the sea, the upper part of the mountain is quite alpine in character, and the panorama is admirable. The excursion may be easily made from *Chambéry*, and may be recommended to those who are approaching the *Savoy* or *Dauphiné Alps* from that city. To avoid the inconvenience of taking

wrong paths in the forest it is expedient to take a guide. The way usually followed is by the hamlet of La Palud (where a guide may be engaged), $\frac{1}{4}$ hr. above Chapareillan. For $\frac{1}{2}$ hr. farther the way lies over marshy meadows, and then through a forest, in which deciduous trees ultimately give place to pines. After a rather steep ascent the track passes a shepherd's hut, and soon after attains the highest plateau of the mountain, composed of calcareous rock, traversed by a system of fissures much resembling glacier crevasses.] 3 m. beyond Chapareillan is the village of *Les Marches*, about $\frac{1}{2}$ m. distant from the rly. station, called Route de Grenoble. From thence Chambéry (Rte. A) is reached either by road or rly., passing through very pleasing scenery.

ROUTE C.

GRENOBLE TO CHAMBÉRY, BY MONTMÉLIAN AND THE LEFT BANK OF THE ISÈRE.

	Kilomètres	Eng. miles
Domène . . .	10	$6\frac{1}{4}$
Tencin . . .	16	10
Goncelin . . .	4	$2\frac{1}{2}$
Pontcharra . . .	10	$6\frac{1}{4}$
Montmélian . . .	10	$6\frac{1}{2}$
Chambéry . . .	14	$8\frac{1}{2}$
	<hr/> 64	<hr/> 40

The rly. along this bank of the river, between Grenoble and Montmélian, is in progress. The road is daily traversed by several diligences.

On leaving Grenoble the road is carried nearly due E., avoiding the banks of the Isère, which here follows a very sinuous course. On the opposite bank many villages and hamlets are seen, perched upon a sort of terrace running along the middle height of the mountain range that extends from the Mont Rachais to the Mont Granier, but which are invisible from the road of the rt. bank. At *Gières*, about 4 m. from Grenoble, where there are many

pretty villas, the road crosses the Sonnant torrent, descending from St. Martin d'Uriage. The next village is

Domène (H. du Commerce), on the Doménon, one of the chief torrents descending from the Belledonne. This supplies abundant water-power, which is applied to various industrial uses. There are here the ruins of a church belonging to a monastery destroyed during the Revolution; and at a short distance is a bridge leading to the rt. bank of the Isère. 3 m. farther on the high-road is *Lancey*, where the road crosses a powerful torrent descending from the Lac du Crozet (6,457'), which lies under the peak of the *Grande Lance* (9,246'). To the rt. of the road is seen a fine château belonging to M. de Boys, which commands an admirable view of the valley of Graisivaudan. $16\frac{1}{4}$ m. from Grenoble is *Tencin*, on a torrent from the Dent de la Prat, another of the peaks of the Belledonne range. In the grounds of a château belonging to M. de St. Eynard, the representative of one of the oldest families in this part of France, is a gorge abruptly barred across by a wall of rock. This spot, called Bout du Monde, is often visited by strangers. Near to this is the suspension bridge over the Isère, leading to Le Touvet. $2\frac{1}{2}$ m. farther on is *Goncelin*, a large scattered village, the lower part of which was utterly destroyed by a waterspout in 1827. A country road leads in 8 m. to the Baths of Allevard (Rte. D), a more direct way from Grenoble, but less interesting than the road by *Pontcharra*, a large village, just half way between Goncelin and Montmélian, close to the junction of the Bréda with the Isère. For the road from thence to Allevard, see Rte. D. About a mile from Pontcharra are the remains of the *Château de Bayard*, the birthplace of the illustrious Chevalier de Bayard. Though in sadly neglected condition, the place deserves a visit. The offices serve as a farm-house, and but one of the three floors which composed the main building now remains.

The road from Pontcharra to Montmélian is very beautiful, lying chiefly among orchards, with the fine range of the Mont Granier on the opposite side of the valley full in view.

Montmélian (Hôtel des Voyageurs) was once famous as one of the strongest fortresses in Europe. The works are now in ruins, and the chief importance of the place arises from its position at the junction of the Victor Emmanuel rly, with the road to Grenoble. There are but three trains daily to Chambéry. (See Rte. B.)

ROUTE D.

CHAMBÉRY TO THE BATHS OF ALLEVARD. EXCURSIONS FROM ALLEVARD.

38 Kilomètres=23 $\frac{3}{4}$ Eng. miles to Allevard.

The road to Allevard turns off from the high-road between Grenoble and Montmélian (Rte. C) at the village of Pontcharra. Those who hire a carriage at Chambéry may choose between that road and another equally interesting, and about the same in distance, by Les Marches and the Fort of Barraux (Rte. B), reaching Pontcharra by a suspension bridge across the Isère. From *Pontcharra* the road mounts along the l. bank of the *Bréda* through very beautiful park-like scenery, and commanding pleasing views of the surrounding mountains, especially in descending from Allevard. Near the village of Montaret (5 $\frac{1}{2}$ m. from Pontcharra) the valley turns sharply to the S., and the road, keeping to the l. bank, mounts gradually above the *Bréda*, which runs in a deep gorge below. The snowy mass of the *Gleyzin* appears to close the head of the valley.

At 14 kilomètres, or 8 $\frac{3}{4}$ Eng. m., from the high-road, are the Baths of *Allevard* (Inns: H. des Bains, in the court of the *établissement*; H. Planta, both good; H. du Louvre; H. de la

Terrasse, commanding a fine view; besides many other second-rate houses). As usual at watering-places, there are many houses let in furnished lodgings. The waters of Allevard have only of late years attracted much notice, but are now annually frequented by many hundreds of visitors. In composition and qualities they are said to resemble those of the *Eaux Bonnes*. Allevard no doubt owes much of its attraction to the beauty of its scenery, and the mildness of its climate, which is unusually free from fog. The village stands on both banks of the *Bréda*, at about 1,550 feet above the sea. The *Château* is not remarkable, but the adjoining grounds are prettily laid out and much resorted to by visitors. A serious drawback to the advantages of this place is the prevalence of goitre and cretinism among the natives. Invalids should be cautioned against the rapid fall in temperature which usually takes place after sunset.

Among the numerous excursions to be made from the Baths, the most frequented is that to the gorge called *Bout du Monde*, passing a large foundry. The ascent of the *Brame Farine* (3,983'), a point in the ridge between the valley of the *Bréda* and that of the *Isère* may be made in 1 $\frac{1}{2}$ hr. 20 min. from Allevard is a curious ruin called the *Tour de Treuil*, dating from the 9th or 10th century, being the remnant of a castle belonging to the ancient family of *Crouy Chanel*. A path mounts thence through a ravine planted with walnut trees, and then winds up the mountain side to the hamlet of *Crozet*. Several other paths lead from the Baths, and there is no difficulty in finding the way to the *Brame Farine*, which forms the crest of the ridge. From another rocky summit $\frac{1}{2}$ hr. farther S., called *Les Cinq Pointes* (4,232'), the view is still finer. In descending from *Crozet*, visitors often avail themselves of the sledges which are used for the conveyance of wood, reaching the Baths in 15 min.—charge, 2 fr. for two persons. E. of the Baths is the *Taillat* (4,558'),

often ascended for the sake of the view. Mountaineers will prefer to reach the *Petit Charnier* (6,969'), $4\frac{1}{2}$ hrs., or the *Grand Charnier* (8,412'), 6 hrs., from Allevard. (See § 8, Rte. F.) The guides at Allevard are paid from 2 to 3 fr. for short excursions, and from 5 to 6 fr. for longer walks, considered equivalent to a day's work.

In § 8, Rtes. E and F, the principal passes leading from Allevard and the upper valley of the *Bréda* to the valley of the *Romanche*, and to that of the *Arc*, have already been described. Many other easier passes lead in various directions, and may here be briefly noticed.

To Grenoble. A carriage-road much frequented passes by the village of *St. Pierre d'Allevard* ($2\frac{1}{2}$ m.), where a ruined tower is the only remaining vestige of a monastery, dating from the 11th century. $2\frac{1}{2}$ m. farther is the village of *Moretel*, near which are seen the remains of two ruined castles. In traversing by a comparatively low pass the ridge which separates the *Bréda* from the *Isère*, the road commands a fine view of the opposite range of the *Grande Chartreuse*. About 8 m. from Allevard is *Goncelin*, on the high-road from *Montmélian* to *Grenoble*, $18\frac{3}{4}$ m. from the latter town. See Rte. C.

To Chamousset. A char-road leads in about $4\frac{1}{2}$ m. to *Arvillard*, and thence to *La Rochette*, in the valley of the *Gelon*. Following that stream it reaches *Chamousset* in the valley of the *Arc* (§ 7, Rte. A), 15 m. from the *Baths*.

To Aiguebelle. The *Gelon* torrent makes so sharp an angle at *La Rochette*, that by turning slightly to the right at that village from the road just described you ascend the valley, and at its head reach a low pass, *Col de Mont Gilbert*, by which *Aiguebelle* is reached in $5\frac{1}{2}$ hrs. from Allevard.

To Epierre. Three paths lead thither, but though the distance in a direct line is less than to *Chamousset* or *Aiguebelle*, from 6 to 7 hrs. are required. The easiest but most circuitous way is by *La Rochette*. The path mounts thence

by the l. bank of the *Gelon*, passing the hamlets of *Presle* and *Verneil*, turns to the SE. through a lateral valley, leading to the *Col d'Herbarietan*, and then descends to *St. Pierre de Belleville*, on the l. bank of the *Arc*, about $1\frac{1}{2}$ m. below *Epierre*. Another path mounts from *Arvillard* in 20 min. to the hamlet of *Molliex*, and thence ascends the glen of the *Soudron* torrent to the *Col de la Perche*, $2\frac{3}{4}$ hrs. from *Arvillard*. From the *Col* the easiest way is to descend the ravine to the NE., which leads in about 2 hrs. to *St. Pierre de Belleville*. Another and rather shorter way is to pass a second *Col* lying to the E. of the *Col de la Perche*, which leads direct to *St. Leger*, a short distance above *Epierre* on the opposite or l. bank of the *Arc*.

To St. Remy. The most direct course from Allevard to the upper valley of the *Arc* is by the *Col de la Frèche*, which leads by a tolerable path, practicable for mules, in 5 hrs. to *St. Remy*, on the l. bank of the river, about half way between *Epierre* and *La Chambre*. From *Arvillard* the path follows the rt. bank of the *Bens* torrent for about 1 hr. to the *Chartreuse de St. Hugon*, $2\frac{1}{2}$ hrs. from Allevard, and often visited by strangers from the *Baths*. Keeping to the N. side of the valley, often called *Combe de St. Hugon*, the path reaches in $\frac{1}{2}$ hr. farther the hamlet of *Plan*, and then, ascending by zigzags the mountain to the l., attains the *Col* in 1 hr. from the *Chartreuse*. From the summit *St. Remy* is reached in $1\frac{1}{2}$ hr. of rapid descent. By a slight detour of less than $\frac{1}{2}$ hr. through wilder and more striking scenery the traveller may reach another pass — the *Col d'Arpington* — lying a short distance farther S. than the *Col de la Frèche*. Both paths unite again a short distance above *St. Remy*.

ROUTE E.

CHAMBÉRY TO URIAGE — ASCENT OF THE BELLEDONNE.

64 kilomètres=40 Eng. miles.

A pedestrian might occupy two or three days very agreeably on the way from Chambéry to Uriage, avoiding carriage-roads, and taking en route St. Pierre d'Entremont and the Grande Chartreuse (Rte. F). He might thence reach the valley of the Isère at Bernin or St. Ismier, cross the river to Domène, and follow a path which leads direct to Uriage. Those who travel by carriage must follow the road of the l. bank of the Isère (Rte. C) to the village of *Gières*, within 4 m. of Grenoble. The road to Uriage there turns abruptly to the l. through the narrow gorge of the *Sonnant*. About half way, less than 2 m. from *Gières*, the road crosses from the l. to the rt. bank of the stream, passes the hamlet of *Sonnant*, composed chiefly of cabarets and some remains of a ruined castle, and on reaching Uriage enters the court-yard or place of the *Établissement des Bains*. This forms a square wherein stand the principal hotels—H. du Cercle; Grand Hôtel; Ancien Hôtel; H. des Bains. Lodgings may be had in a building called Le Châlet, which is an appurtenance of the *établissement*. Other lodging-houses and several second-rate hotels are to be found at a distance of nearly a mile from the Baths.

Uriage (1,358), though its waters were known to the Romans, has become a convenient and attractive watering-place only within the last 20 years. Of the large number of visitors, sometimes nearly 1,500, a large proportion come from the neighbouring town of Grenoble ($7\frac{1}{2}$ m.), and from Lyons, easily reached by rly. The buildings are handsome and convenient, especially the *Cercle* or subscription rooms, which include a very large saloon, billiard rooms, &c. The foun-

tain is under a covered gallery, where water-drinkers may take exercise in bad weather. The Château d'Uriage contains a collection of local antiquities, some good pictures, and collections of Natural History—all open to visitors. This belongs to M. de St. Ferréol, who is the proprietor of the entire place, and who has laid out large sums in improvements. Of the many excursions that may be made from Uriage, the following may be noticed:—

The ascent of the Montagne des Quatre Seigneurs (3,094'). The summit, reached in $1\frac{1}{2}$ hr., commands a fine view of the neighbouring country.

The *Cascade de l'Oursière*, at the foot of the Belledonne, often visited from Uriage, is distant $3\frac{3}{4}$ hrs. This may be taken in the ascent to the Chanrousse, or in that of the Belledonne.

The Chartreuse de Prémol is in a fine position (3,593'); little now remains of this convent, once very considerable, but destroyed at the Revolution. It may be reached in $1\frac{3}{4}$ hr. from Uriage. $\frac{1}{2}$ hr. from the Chartreuse is the *Col de Prémol*, whence a path descends in 2 hrs. to Séchillienne in the valley of the Romanche (§ 8).

Vizille (§ 8, Rte. A) is reached by a carriage-road in $5\frac{1}{2}$ m., passing *Vaulnaveys*, where are several inns and lodging-houses, frequented for the sake of economy by many of those who use the waters of Uriage.

The ascent of the *Chanrousse* is often made by pedestrians who do not undertake the more difficult and laborious escalade of the Belledonne. The summit (7,372') is marked by a cross, which from its great size is apt to mislead those who suppose themselves near to the top of the mountain. The view is very fine, but to the N. and NE. the panorama is closed by the higher summits of the Belledonne range. The easiest way is by the Chartreuse de Prémol, $1\frac{3}{4}$ hr.—Thence to the top $3\frac{3}{4}$ hrs. A steeper and shorter way is by the Recoin, a gorge E. of the Baths of Uriage, by which the summit may be

reached in $4\frac{1}{2}$ hrs. A longer but more interesting path is by the Cascade de l'Oursière, and the *Lac Robert*—an Alpine lake traversed by a curious natural causeway. In descending from the summit by way of the Lac Robert, a traveller bound for Bourg d'Oisans may reach the *Col des Escombaillies* in 2 hrs. from the lake, and then descend in 1 hr. 40 min. to Livet in the valley of the Romanche, 8 m. from Bourg d'Oisans (§ 8, Rte. A).

To a mountaineer the most interesting excursion to be made from Uriage is the ascent of the *Belledonne*. This may be reached by various paths, all of them rather steep, but none of them presenting serious obstacles. If made in one day, the expedition is long and fatiguing, and it is desirable to start before daylight. A good mule-path leads in $3\frac{3}{4}$ hrs. to the Cascade de l'Oursière. The path then ascends through a pine forest to an Alpine pasture with a chalet, apparently walled in by a steep range of rocks. These, however, are climbed without much difficulty; above them is another chalet, the highest on this side of the mountain, where strangers, bent on the ascent, sometimes pass the night. This stands in the midst of a cirque, or natural amphitheatre, whence there is no exit save by a stiff climb up the rocks to the l. A succession of small pools now lead to a mountain tarn of larger size, the *Lac de Doménon*, often frozen over throughout the summer. The direct way to the top is by a steep slope of névé, which may, however, be avoided by a slight detour. In either case the traveller reaches a considerable snow-field nearly level, where in hot summers a small lake is sometimes formed. A farther ascent of $\frac{1}{2}$ hr. now leads to the highest accessible peak of the mountain (9,780'), marked by a cross. The highest peak of all, which surpasses this by a few metres, is considered utterly inaccessible. With the slight drawback of the horizon being broken at this single point, the panorama is

magnificent, as might be expected from the position of the peak, the westernmost high summit in the range of the Alps.

A somewhat less laborious way than that just described is from the village of Revel, most easily reached from Domène (Rte. C) in the valley of the Isère. The track along the rt. bank of the Doménon torrent, ascending by the second path, which turns to the l. (the first path is said to be too steep), leads in $1\frac{1}{4}$ hr. from Domène to *Revel*. Food and beds are found here chez Belot, traiteur. Mules may also be hired for the first 3 hrs. of the ascent, which conduct the traveller to the *Lac du Crozet* (6,457'), very finely placed in a gorge between the *Grande Lance* (9,246') and the *Colon* (7,851'). A steep ascent, not practicable for mules, leads thence to the Petit, and then to the Grand Lac de Doménon, at the latter of which this path joins that above described. The Lac du Crozet may also be reached direct from Lancey, on the high-road, 3 m. N. of Domène, through the Combe de Lancey. The Belledonne is also accessible from the valley of the Olle and from that of the Romanche; and an active pedestrian, starting very early, may take the summit in his way from Uriage to Bourg d'Oisans. Bearing to the S., a descent of $\frac{3}{4}$ hr. from the top leads to a streamlet which descends into the Vallée du Bâton between the Grande Lance and the *Grande Vou-dène*. This stream is followed for a considerable distance until, on approaching the verge of the deep gorge of Infernet through which the Romanche runs, between the Taillefer and the range of the Belledonne, the Bâton is left on the rt., and a track leads nearly due E., parallel to the course of the Romanche, until, in $4\frac{1}{2}$ hrs. from the summit, it descends into the valley a short distance from Sables, 5 m. from Bourg d'Oisans. The descent from the Belledonne into the valley of the Olle is very steep and rapid. An active pedestrian may reach *Artical*, about

$\frac{1}{2}$ hr. below Rivier (§ 8, Rte. D), in 3 hrs. from the summit.

ROUTE F.

CHAMBÉRY TO GRENOBLE, BY THE GRANDE CHARTREUSE.

The celebrated monastery of the Grande Chartreuse stands about the centre of the range of limestone mountains that extend along the rt. bank of the Isère between Grenoble and Chambéry. It is one of the few great monastic establishments that have survived the revolutions of the last century. Remaining nearly in its original state, and with the primitive severity of its discipline unrelaxed, it still presents a living image of the institutions which had so great a part in forming the religious, intellectual, and social condition of Europe during the long period between the fall of the Roman Empire and the diffusion of printing. The interest naturally attaching to the building is much enhanced by the beauty and singularity of the scenery which surrounds it. It is true that since railway trains have begun to carry holiday-seekers from Lyons and Grenoble to the not distant stations of Voiron and Voreppe, and a good road has been carried up to the very gate of the monastery, those who come here intending for a moment to revert from the present to the past are liable to unexpected disenchantment. Such persons should choose for their visit the season of winter or early spring, when the community, undisturbed by visitors, have, in addition to the severity of their rule, to struggle against the rigour of the climate. The lover of nature may at every season find the tranquillity which he desires, for, excepting the road from St. Laurent du Pont and the bridle-road from Grenoble by Sappey, the other approaches to the monastery herein indicated are rarely disturbed by the presence of a stranger.

As already intimated, the mountains of this range are, on the one hand, un-

mistakeably connected with the Alps through the parallel range of the Belledonne, while, on the other, they are linked to the Jura by the ridge of the Mont du Chat. Although much bolder and more imposing, the scenery has perhaps more of the character of the Jura than the Alps. As in the former range, the general outline is very uniform, and the summits, which are in truth ridges rather than peaks, all lie nearly within the limits 6,300–6,800 Eng. ft. But this outward uniformity gives place to great variety and boldness of scenery in the interior of the valleys, which are for the most part clefts of variable width, walled in by steep rocks, often quite precipitous. The whole district is traversed by paths not seldom intricate and misleading, and the mountaineer who may suppose that among ranges of such moderate height no especial precaution is necessary, is warned that local knowledge is more needed here than in the higher regions of the Alps. In the valleys, even where the path does not lie through pine-forest, the view is generally much restricted, while from the upper ridges a precipice more than 1,000 ft. in depth is often not suspected until the traveller has reached its very verge.

A detailed account of the many routes that traverse this range, and the numerous excursions that may be made from the Grande Chartreuse, scarcely enters into the plan of this book. The more interesting of them are briefly noticed here. For further details the traveller may consult Joanne's 'Guide to Dauphiné,' Part I., or some of the numerous local Guides to be found at Chambéry or Grenoble.

It will be most convenient to notice separately the principal ways for reaching the Chartreuse from Chambéry, and then the routes thence to Grenoble.

1. *Chambéry to the Grande Chartreuse, by St. Laurent du Pont.* $14\frac{1}{4}$ miles to Les Echelles; $4\frac{1}{4}$ hrs. or about 14 m. thence to the Chartreuse. About $5\frac{1}{2}$ hrs. in a light carriage, exclusive of a halt at St. Laurent du Pont.

The ridge of the Mont du Chat is to some extent continuous with the range of the Chartreuse, and though diminished in height, it serves to form a continuous barrier between the basin of Chambéry and the plains of France. The lowest point of this barrier is near to Les Écheltes, but the natural difficulties of the passage were such, that until the completion of the new road and tunnel in 1815, the longer and steeper ascent of the Mont du Chat was the road ordinarily followed between France and Savoy. From Chambéry the road to Les Écheltes, after passing the village of Cognin, follows the upward course of the *Hière*, which flows from the SW. The basin of Chambéry gradually contracts, until, at the village of *St. Thibaud de Cour*, the road fairly enters the defile leading to the pass, between the Mont Grelle (4,649'), belonging to the range of the Mont du Chat, and the Cochette, directly connected with the Grande Chartreuse group. In less than 4 m. of gentle ascent the road reaches the summit of the pass which, from the name of the small village that stands at the top, is called *Col de St. Jean de Cour*, 2,040 ft. above the sea. From the village, just 10 m. from Chambéry, the descent commences through a natural cleft in the limestone rock, until the road enters a tunnel about 340 yards in length. At the opposite end a remarkable view suddenly presents itself. The tunnel has been bored through a great wall of limestone, and the W. end issues at about 850 ft. above the valley of the Guiers, which is backed by the higher mountains of the Chartreuse range. After descending a part of the way towards Les Écheltes, the apparent impossibility of carrying a road across the formidable wall of rock that bars the passage is more striking than from above. The ancient route lay in part through a cavern, which was at the same time the channel of a stream, and which was reached on the W. side by ladders fixed to the rocks. In 1670 Charles Emmanuel, Duke of Savoy, achieved the construction of a new road passable

for chars; though long abandoned, it still exists, very rough and difficult, but worth a visit by a pedestrian. The present road and tunnel were commenced by Napoleon, and completed in 1815 by the Piedmontese Government.

Les Écheltes (Inns: Lion d'Or; St. Jean) derives its name from the ladders that gave access to the above-mentioned ancient passage. The village stands on both banks of the *Guiers*, which has here united the two streams—*Guiers Vif* and *Guiers Mort*—that drain the larger portion of the Grande Chartreuse range.

[From Les Écheltes the high-road to Lyons, little used since the opening of the rly., leads in $9\frac{1}{2}$ m. along the Guiers to Pont de Beauvoisin (Rte. G). About half way the road is carried at a considerable height above the stream through the defile of *La Chaille*, and on emerging from it gains an admirable view over the richly cultivated undulating country to the NW.]

Following up the stream of the Guiers Mort, it is little more than 4 m. from Les Écheltes to *St. Laurent du Pont*, where there are several inns, at which vehicles or mules may be hired. $\frac{1}{2}$ hr. from the village is the narrow cleft that allows the stream to escape from its mountain birth-place, and at the same time affords the only easy access to the retreat which for so many centuries has been inhabited by the followers of St. Bruno. A gate formerly closed the road, and held guard over all communication between them and the outer world. For 1 hr. the road is carried along the l. bank of the Guiers Mort through scenery which, if not of the grandest character, is wild and impressive. At the Pont de St. Bruno the stream is crossed, and here the new road begins. The work presented considerable engineering difficulties, and involved the construction of three tunnels; but whatever other advantages it may possess, it has certainly deprived the monastery of a portion of the charm which it formerly owned over the imagination of the poet and the artist. Turning to the L, the road quits

the valley of the Guiers, and mounts towards the N. till it enters an upland basin, in great part clothed with pine forest, and overhung on the E. side by the mural precipices of the Grand Som. In the centre of this solitude is the pile of buildings that form the monastery. In this, the parent house of the Carthusian order, the original rule is observed in all its severity. The monks never eat meat, and their diet is at all times of the most frugal kind; they rise at midnight for prayer, and their lives are passed between the church and manual labour. Excepting those whose office requires intercourse with strangers, they never speak save on special and rare occasions, and their only recreation is to walk within certain specified bounds near the monastery. Strangers are received by one of the monks appointed for that duty, and twice in the day they are conducted to see the church and the rest of the building. Their dietary includes fish and eggs, but no meat. The beds are rough, but quite clean. Without special permission no stranger is allowed to remain more than two nights. On leaving, a moderate payment is made by each person. As no women are allowed within the walls of the monastery, ladies are forced to remain at an outer building, where it is said that they find but indifferent accommodation.

The scenery surrounding the monastery is fine enough to make the place interesting, apart from any special associations. To the botanist this neighbourhood is made attractive by the presence of several species which are elsewhere rare or quite unknown in the Alpine chain—e.g. *Hypericum nummularium*, *Erinus Alpinus*, &c.

The most interesting excursion for the mountaineer is the ascent of the Grand Som (6,660'). This involves a considerable detour, for every apparent short-cut in the direction of the summit leads to the base of the formidable precipices that form its W. face. Half an hour's walk from the monastery is the Chapelle de St. Bruno, erected on the

supposed site of his original hermitage. About 2 hrs. more suffice to reach the summit. The view is fine, and the expedition presents great variety of scenery within comparatively narrow bounds. Among other interesting plants the botanist will observe *Potentilla nitida*.

Less than 2 hrs. suffice for the return to the monastery.

2. *Chambéry to the Grande Chartreuse, by the Col de la Ruchère.* This way is somewhat longer than that above described, and the scenery, though fine, is in itself less striking; but it has the advantage of approaching the monastery by an unfrequented path away from the ordinary track of visitors. From Les Échelles the char-road along the Guiers is followed for 1 hr. 40 min. to *Rioubregond*, whence a foot path leads in 20 min. to the hamlet of La Ruchère. An ascent of $1\frac{1}{2}$ hr. now suffices to reach the *Col de la Ruchère*, about 4,600 ft. in height, commanding a very fine view of the neighbouring mountains. A descent of 20 min. leads from the Col to the Vacherie, where the cows of the monastery are kept; $\frac{1}{2}$ hr. farther is the Chapelle de St. Bruno; and another $\frac{1}{2}$ hr.—4 hrs. 50 min. from Les Échelles—conducts the traveller to the monastery.

3. *Chambéry to the Grande Chartreuse, by St. Pierre d'Entremont.* *St. Pierre d'Entremont* is a village finely situated in the valley of the Guiers Vif, with an inn chez Paquet. It may be reached in about $2\frac{1}{4}$ hrs.' walking from Les Échelles, but a pedestrian will prefer some one of several mountain paths that lead thither in 5 or 6 hrs.' walk from Chambéry. The most interesting is by the *Col de Frêne*, immediately NW. of the Mont Granier. The ascent of that peak (Rte. B) might easily be included in the day's walk. [An interesting excursion may be made from St. Pierre to the source of the Guiers Vif. An hour's walk from the village, at the hamlet of Mesme, it is necessary to take a guide, with a ladder and lights, by which to gain access to the cavern whence the

torrent issues. A rough path leads to the *Col de Valfroide*, and thence, by a very steep and rather difficult descent, to the valley of the Isère near to Le Touvet (Rte. B), which in this way is $5\frac{1}{2}$ hrs. distant from St. Pierre.] The Grande Chartreuse is easily reached in $3\frac{1}{2}$ hrs. from St. Pierre d'Entremont by the *Col de Bovinant*.

(1) *Grande Chartreuse to Grenoble, by Voiron or Voreppe*. The easiest route to Grenoble is to return by the road to St. Laurent du Pont, $1\frac{1}{2}$ hr. in a carriage, descending the valley. Thence an agreeable drive of 10 m. through very pleasing scenery leads to *Voiron* (Inns: H. du Midi; H. du Commerce; H. du Cours; H. de la Poste), a station on the rly. from Lyons to Grenoble, about 16 m. from the latter city. There are 5 trains daily in 45 min. A pedestrian may shorten the way from St. Laurent to Voiron by following a path through a cleft, called Le Petit Crossey.

There is another road from St. Laurent, leading in about 11 m. to the *Voreppe* station, only about 9 m. by rly. from Grenoble.

(2) *Grande Chartreuse to Grenoble, by the Col de la Cochette*. This way is little frequented, though decidedly more interesting than that by Sappey. It being easy to take a wrong turn in the pine forest, it is advisable to hire a guide. About $2\frac{1}{2}$ hrs. are required to reach the *Col de la Cochette*, which is a narrow cleft in a ridge of limestone rocks. A walk of $1\frac{1}{4}$ hr., for the most part through a noble pine forest, now leads to a second and lower pass—*Col de la Charmette* (about 3,940')—whence there is a rather long descent of $3\frac{1}{2}$ hrs. to St. Robert, the last station on the rly. to Grenoble, only $4\frac{1}{2}$ m. from the city.

(3) *Grande Chartreuse to Grenoble, by Sappey*, 6 hrs.' walk or ride. This is perhaps the least interesting of the various tracks leading to the monastery, but, being a perfectly easy and safe bridle-path, it is, with the exception of the road from St. Laurent du Pont, by many degrees the most frequented

approach. About a mile from the Grande Chartreuse is a large building called La Courrierie, a dependency of the monastery, containing a printing office and various other appurtenances. $\frac{1}{2}$ hr. farther the path passes through a narrow defile, where a gateway, called L'Entrée du Désert, marks the boundary of the Chartreuse. On the way to the hamlet of *Cottaves*, the track passes below a very ancient village, *St. Pierre de Chartreuse*, which originally gave its name to the monastery. In about 3 hrs. from the monastery the traveller reaches the highest point of the route at the *Col de la Porte* (4,436'), and in $\frac{3}{4}$ hr. more attains

Sappey (Inn: A l'Arrivée des Touristes), a small village where visitors and their guides usually halt for refreshment. In $1\frac{1}{2}$ hr. from hence the summit of *Chamechaude* (6,847'), the highest point of the Grande Chartreuse range, is reached without difficulty. From Sappey to Grenoble the descent through a depression between the Mont Rachais and the Mont St. Eynard is long (2 to $2\frac{1}{4}$ hrs.), and for the most part uninteresting. At 1 hr. from Sappey is a house called La Maison Pilon, where, although it is not an inn, tourists mounting from Grenoble often breakfast better than at Sappey. On approaching Grenoble, some fine views are gained over the valley of Graisivaudan and the higher ranges of the Dauphiné Alps.

Three other paths leading from the Grande Chartreuse to St. Ismier and Bernin in the valley of the Isère are noticed in Rte. B.

ROUTE G.

CHAMBÉRY TO PONT DE BEAUVOISIN,
BY AIGUEBELLETTE.

Mule-path in 7 hrs.

Between the Dent du Chat (Rte. A) and the high-road from Chambéry to Les Echelles, the prolongation of the ridge of the Mont du Chat, called *Mont*

de l'Épine, maintains an average height of about 4,000 feet. On the W. side of the watershed, at a height of 500 or 600 ft. above the level of the Guiers and the Rhone, is an extensive plateau, the southern portion of which is occupied by the lake of Aiguebellette. The direct way from Chambéry to Pont de Beauvoisin lies by the shores of the lake, and it is one of the many agreeable excursions available to a pedestrian in this part of Savoy.

Beyond Cognin, $1\frac{1}{4}$ m. from Chambéry, a path mounts in 40 min. to *Vimine* (Via Minima), and from thence follows the line of the ancient Roman road, very rough and not passable for horses, till in $2\frac{1}{4}$ hrs. from the city it attains the *Col d'Aiguebellette* (2,995'), commanding an admirable view of the basin of Chambéry, the Lake of Bourget, and the ranges of the Savoy Alps. The Col is accessible by a char-road from Chambéry, which makes a considerable detour by the village of St. Sulpice. [From the same village another road practicable for charrs mounts by zigzags to the NW., passes the Mont de l'Épine by a col about 3,300 ft. in height, descends to *Novalaise*, a village where many Roman medals and inscriptions have been found, thence bears due N. to *Marcieux*, and follows the *Flon* torrent to Yenne on the Rhone, at the W. base of the Col du Mont du Chat.] The char-road descends in $\frac{3}{4}$ hr. from the Col d'Aiguebellette to the miserable village of the same name, where a very poor inn (Cheval Blanc) affords scanty entertainment. During the descent the road commands very pleasing views of the *Lake of Aiguebellette*. This tranquil sheet of water is about $2\frac{1}{2}$ m. in length, and $1\frac{1}{2}$ m. wide; on its shores, and upon an island, are various vestiges of the Roman occupation of this district. A low ridge is crossed between Aiguebellette and the equally poor village of *Lepin*, both surrounded by magnificent walnut trees. From the latter village the path follows the shore, and thence descends along the *Tier* torrent, which drains the lake, as far as the village of

Bridoire, nearly 2 hrs. from Aiguebellette. To reach the valley of the Guiers, it is now necessary to descend a steep escarpment of limestone, which is a continuation towards the N. of that pierced by the tunnel above Les Échelles. The main track makes a circuit, but there is a shorter foot-path, which descends the face of the rock by steep and narrow ledges. From the base of the rocks the path passes through a rich tract and over a low wooded hill to Dormessin, on the high-road from Les Échelles, $1\frac{1}{4}$ m. from

Pont de Beauvoisin (Inns: La Poste, very good; H. des Courriers; Parfaite Union), formerly the frontier town between France and Savoy on the main road to Chambéry. Those who have come hither from Chambéry by the above route, or by Les Échelles, may prolong an agreeable excursion by following the road along the rt. bank of the Guiers to *St. Genix d'Aoste* (Inn: chez Labully, looks comfortable), once an important Roman station, near the junction of the Guiers with the Rhone. Thence a road is carried along the E. or l. bank of the Rhone, at some distance from the stream, and in 10 m. reaches *La Balme*, a village lying at the base of a range of precipitous rocks, pierced by many grottos, or *balmes*, and connected by a suspension bridge with the opposite bank of the Rhone, on the site of an ancient bridge, probably of Roman origin. Nearly opposite is an isolated rock about 500 feet above the river, surmounted by the Fort of *Pierre Castel*. The original building was a Carthusian monastery, which was seized at the Revolution, and has since served as a prison and fortress. The view of the valley of the Rhone from the hill above the Fort (about 1 hr.'s walk) is extremely fine. 2 m. from La Balme is *Yenne* (Inns: Clef d'Or; Rose Couronnée. 'The inn at Yenne very good and comfortable, though rather dear.'—E. L.), a small town on the Rhone which, after escaping from the marshes near Culoz that occupy the depression between the Mont Colombier

and the Mont du Chat (Rte. A), flows to the S. along the W. flank of the latter ridge. Yenne is about 7 m. from the Col du Mont du Chat (Rte. A), whereby Chambéry is distant 33 kilomètres = $20\frac{1}{2}$ Eng. miles.

ROUTE H.

AIX LES BAINS TO CHÂTELARD — BEAUGES MOUNTAINS.

As stated in the introduction to this section, the Beauges mountains consist of a series of parallel ridges running from NNE. to SSW., bounded to the N. by the Lake of Annecy and the valley of the Eau Morte, to the S. by the basin of Chambéry, and cut through in the midst by the valley of the Chéran. These ridges form a distinct district, which has preserved from very early times its own peculiar manners and customs, and where even now, with the exception of an occasional naturalist, strangers are rarely seen. Possessing unusually fine pastures, the district abounds in cattle, and cheese is its chief product. Excepting in the chief village, Châtelard, the population is dispersed in small communities or clans, which have a system of internal self-government essentially republican; the general manager, the head dairy-woman, and the chief herdsman being elected by the clan. An excursion of 2 or 3 days from Aix or Annecy to Châtelard, and from thence by some one of the passes that lead to Chambéry, will interest a traveller curious to observe the primitive customs of a secluded people. It is said, however, that within the last few years increased communication with the outer world has begun to modify the traditional existence of the district. A char-road leads from Aix les Bains to Châtelard, and there are several mountain paths, which are briefly noticed below.

1. *Aix to Châtelard by Cusy.* Char-road. $6\frac{1}{2}$ hrs.' walking.—About 2 m. from Aix is the village of *Grésy*

sur Aix, near to which is a pretty waterfall, one of the chief resorts of visitors. Beyond the village the road gradually ascends along the *Sierroz* stream to an undulating plateau, where (3 hrs. from Aix) stands the village of *Cusy*. To the N., on a rock washed by the Chéran, are the extensive ruins of an ancient castle. The road, which has hitherto been directed to the NE., now makes a sharp turn to the SE., ascending along the l. bank of the Chéran. On the opposite bank are seen the hamlet of Aiguebellette and the castle of St. Jacques. Here three singular peaks, or rather obelisks, of rock rise abruptly from the valley, standing side by side, with an interval of but a few yards between them. The road is still carried along the l. bank at a considerable height above the river, and about $4\frac{1}{2}$ m. beyond Cusy passes opposite the village of *Allèves*. 2 hrs. from Cusy the Chéran is crossed by a very ancient bridge—*Pont de Bange*—the foundations of which are said to be of Roman construction, and thenceforward the road keeps to the rt. bank of the stream. [A road along the rt. bank of the Chéran leads in $5\frac{1}{2}$ hrs. from the Pont de Bange by Allèves and Mures to *Alby*, on the road from Aix to Annecy (§ 12).] Not far from the bridge, where the road is hemmed in between the rocks and the stream, is the entrance to the *Grotte de Bange*, a cavern which contains a subterranean lake, 216 feet below the level of the entrance, and approached by a gallery about 270 yards in length. The lake appears to be about 100 yards in circumference, but it has never been thoroughly explored. Leaving on the l. hand the new road leading by the Col de Leschaux (Rte. L) to Annecy, the road to Châtelard crosses the torrent which descends from that pass by the Pont de la Charnia, leaves on the rt. hand a bridge over the Chéran leading to the village of *Les Cheraines*, and in $1\frac{1}{2}$ hr. from the Pont de Bange reaches

Châtelard (Inn: chez Lubin), a village 2,500 feet above the sea, composed of a

single long street backed by a steep escarpment of rocks. On the opposite side of the valley rises the steep ridge of the Rosanne, and to the SE. opens the picturesque upper valley of the Chéran. A very fine view of the valley and the surrounding mountains is obtained from the ancient castle, standing on a rock above the village. This is most easily reached by following the road up the valley, which descends to the level of the river, and crosses to its rt. bank. $\frac{1}{2}$ hr. from the village there is a second bridge, which recrosses the Chéran, and leads to a shady path ascending from the l. bank of the stream to the castle, $\frac{3}{4}$ hr. from Châtelard.

2. *By the Col de Prabarno and Saint Offenge.* Mule-path in $5\frac{1}{4}$ hrs.—Nearly 2 hrs. from Aix, on the road to Cusy, a mule-path turns to the rt., crosses the Sierroz, and traverses the villages of *St. Offenge-Dessous* and *St. Offenge-Dessus*. From thence a steep and stony path leads up to the *Col de Prabarno*, 3 hrs. from Aix, commanding a fine view of the Lake of Bourget to the W. and the Lake of Annecy to the NE. The path descending from the Col winds amidst rich pastures, passing some châteaux and the hamlet of Montagny, to *Arith* (Inn: chez Mouchet Laurent), a rather large village overlooking the valley of the Chéran. A steep descent leads to a bridge over the lateral stream of the Noyer, and soon after to the Pont de les Cheraines, from whence it takes 15 min. to gain the road to Châtelard, which is $2\frac{1}{4}$ hrs. from the Col.

3. *By the Col de la Cochetta.* $5\frac{1}{2}$ hrs.—The Col de la Cochetta is a notch sharply cut into a rocky ridge about $\frac{1}{2}$ m. farther S. than the Col de Prabarno. The approach to it on both sides is somewhat longer and steeper. It may be reached from Aix by the village of *Trevignin*, or else by the road leading from Grésy to Cusy, taking a path which leaves on the l. the two villages of *St. Offenge*, and passes the hamlets of Crosel, Gonard, and Coral Vaulier. On the E. side of the Col it

joins the path from the Col de Prabarno at the hamlet of Montagny.

4. *By the Pas de la Cluse.* $5\frac{1}{2}$ hrs.—A bridle-path leading E. from Aix, and ultimately mounting through a wooded ravine, attains in nearly 1 hr. (ascending) the village of *Trevignin*. About 2 m. farther is *Decampoux*, the highest hamlet. From hence the path winds for a considerable distance round the head of the glen, whose torrent joins the Sierroz below *St. Offenge*, partly over a rocky slope, partly through woods. The highest point is passed in traversing a ridge of rock before reaching the pass. In following this route from Châtelard to Aix it is necessary to avoid a path which descends the glen towards the Sierroz, as that involves a considerable detour. Nearly 3 hrs. from Aix are required to reach the *Pas de la Cluse*, a depression between grass-grown rounded knolls, that leads into the valley of the Noyer, one of the affluents of the Chéran. A few minutes below the pass is a châtlet with a spring, and before long the path gains a point where it overlooks the valley of the Noyer and the principal ranges of the Beauges. Exactly opposite is the ridge of the Margeria (5,909'); beyond it to the l. is the Rosanne, between Aillon and Châtelard; then the Cime de Bellevaux and the Mont Trelod. The path descends gradually, winding at mid-height along the side of the valley. In little more than 1 hr. it reaches *Arith*, and in $2\frac{1}{2}$ hrs. Châtelard.

ROUTE I.

CHÂTELARD TO CHAMBÉRY.

The Beauges mountains are traversed in all directions by paths for the most part of no difficulty. It is therefore easy to multiply the routes which a traveller may, if so minded, discover for himself. It will be sufficient here to indicate the more interesting paths.

1. *By the Col de Plain Palais.* $6\frac{1}{4}$ hrs.' walking. A char-road.—From the

Pont de les Cheraines, about $\frac{3}{4}$ hr. below Châtelard, the char-road mounts to the village of the same name at the opening of the valley of the *Noyer*. A road runs along both banks of the stream; that of the S. side, or the rt. bank, is the better for vehicles. On that side is the village of *Noyer* (2,713'), 1 hr. from Les Chéraines, 2 hrs. from Châtelard. In following the road of the l. bank, the traveller passes near the remains of a Roman aqueduct, partly cut into the rock, known to the natives as La Crèche. 1 hr. ascending from Noyer suffices to reach the *Col de Plain Palais* (3,717'). A gentle descent of 40 min. leads to the village of *Désert*, standing on a plateau between the *Mont Margeria* and the *Dent de Nivolet*. Either summit may be reached from here, but the ascent of the former is said to be from this side difficult and dangerous, while the view is decidedly inferior to that from the lower, but better situated, *Dent de Nivolet*. The road descending along the rt. bank of the torrent, round the base of the rocks of Chaffardon, in 1 hr. 50 min. from the Col reaches *St. Jean d'Arvey*, and in $3\frac{1}{4}$ hrs., passing through very agreeable scenery along the rt. bank of the Laisse, attains Chambéry.

2. *By the Valley of Aillon and Thoiry.* $5\frac{1}{2}$ hrs.—Nearly opposite to Châtelard is the opening of the picturesque *Vallée d'Aillon*. The road crosses the Chéran a little below the village, and after passing several small hamlets reaches in 1 hr. *Aillon le Vieux*, standing at the W. base of the Rosanne. 1 hr. farther is the highest village, *Aillon le Jeune*. Here the direct way to Chambéry lies to the rt., or SSW., through a short glen, and in $\frac{1}{2}$ hr. reaches the *Col des Prés*. The track then winds along the side of the mountain, and in 1 hr. reaches the village of *Thoiry*, and then crossing the valley and the torrent which descends from *Désert*, joins the carriage-road close to *St. Jean d'Arvey*.

3. *By the Chartreuse d'Aillon and the Col de Landar.* $7\frac{1}{2}$ hrs.—Above the village of *Aillon le Jeune*, 2 hrs. from Châtelard, a narrow defile, wherein are

seen some remains of ancient forges, opens to the E. After $\frac{1}{2}$ hr. the principal track turns to the S., leading towards Chambéry, while another path to the l. is the entrance to the *Combe de la Chartreuse d'Aillon*. This is an enclosure formed by steep mountain ridges, a natural trough, with this single opening, so narrow that it was formerly closed by a gate. The only other access is by a difficult pass—*Col de Feille*—leading to the upper valley of the Chéran. In this secluded spot formerly stood the *Chartreuse d'Aillon*, a monastery founded in 1184, once rich and extensive, now utterly a ruin. It might, however, repay the visit of a competent antiquary. The rich pastures of the valley produce a kind of cheese, called *vacherin*, which is much esteemed.

Returning to the point where the paths diverge, 1 hr. suffices to reach the *Col de Landar*, lying E. of the pointed summit of the *Mont Galoppaz*, a peak commanding a very fine view of the valley of the Isère. The picturesque village of *La Thuile* lies 1 hr. below the Col, at the N. foot of a ridge which on the S. side immediately overlooks Montmélian. From thence it is a walk of 3 hrs. to Chambéry, along the l. bank of the Laisse torrent, passing the village of the same name about 7 m. below La Thuile. It is also possible to descend along the rt. bank of the Laisse by the village of Puigros, from whence the ascent of the Galoppaz may be made in 3 hrs. In the ascent the botanist may find *Lactuca Plumieri*, *Tozzia alpina*, *Tulipa celsiana*, and other rare plants.

4. *By St. Pierre d'Albigny.* $4\frac{1}{4}$ hrs. by char-road to *St. Pierre*; railway to Chambéry 15 m.—Though a considerable detour, this is the easiest way to reach Chambéry from Châtelard. By taking the short-cuts a pedestrian may much abridge the distance. From Châtelard the road descends to the level of the Chéran, and crosses to its l. bank, reaching in 45 min. the pretty village of *Ecole*, at the junction of two lateral

valleys with the main torrent of the Chéran. The road mounts nearly due S. through the rt. hand valley, and in 2 hrs. from Châtelard passes *Sainte Reine*, the highest village. An ascent of $\frac{3}{4}$ hr. leads to the *Col du Frêne*, which commands a very fine view of the valley of the Isère and the ranges beyond it; the road descends in long zigzags, but a pedestrian may avoid these, and so reach in 1 hr. St. Pierre d'Albigny. The station for the rly. to Montmélian and Chambéry is rather more than a mile from the village. By this route a pedestrian may easily reach Châtelard from Chambéry in 5 hrs.

ROUTE K.

CHÂTELARD TO ALBERTVILLE.

6 hrs.

The road from Châtelard to St. Pierre d'Albigny turns aside from the valley of the Chéran at Ecole (see last Rte.). Following up the main valley from that village, the traveller reaches its termination at the ruins of the Benedictine priory of *Bellavaux*, standing at the junction of three mountain torrents. Following that which mounts towards SSW., he may reach the *Col de la Chacette*, from whence a foot-path descends in steep zigzags to Fretterive, on the old road from St. Pierre to Albertville. A more direct way lies through the wild glen which descends nearly due W. to the ruins of the priory, called *Combe de Bellavaux*. After crossing the torrent several times, the path reaches the chalet of Chafuinet, where it divides. The l. hand path mounts to a pass called *Croix de Veraisse*, leading NE. by the village of Seitenex to Faverges, 6 hrs. from Châtelard. The way to Albertville mounts by the rt. hand path to the pass of *Haut du Four*, from whence it descends to Verrens, and in 6 hrs. from Châtelard reaches Albertville (§ 12).

ROUTE L.

CHÂTELARD TO ANNECY.

A new and direct road has been for some time in course of construction, and is probably now completed; but to a pedestrian, either of the two mountain-paths indicated below will be found more interesting:—

1. *By the Col de Leschaux*. Char-road 6 hrs.' walking.—As far as the Pont de la Charnia, $\frac{3}{4}$ hr. from Châtelard, this route follows the main road on the rt. bank of the Chéran (Rte. H). The road to Annecy here turns to the NE., ascending along the rt. bank of the Leschaux torrent. A slight detour by the old road on the opposite bank leads to the Pont du Diable, a bridge thrown over the torrent at a point where it has cut a deep and narrow cleft through the rock. Passing the village of *Glapigny*, $2\frac{1}{2}$ hrs.' steady walking will lead to the summit of the pass, on either side of which are portions of the scattered village of *Leschaux*. The church (3,047') stands close to the top of the Col. The highest point of the long ridge of the *Mont Semnoz*, NNW. of Leschaux, may be reached in $1\frac{1}{2}$ hr. from the village. The height, though only about 5,900 ft., suffices to give an extremely fine panoramic view of the Savoy Alps. It is possible to descend from the summit to Annecy, but a local guide is required. From the Col the road descends for about $1\frac{1}{2}$ hr., gaining on the way some fine views over the Lake of Annecy, and then reaching the level of the plain, joins the road from Albertville (§ 12) along the W. shore of the lake, near the village of St. Jorio, $1\frac{1}{4}$ hr. distant from Annecy.

2. *By the Col d'Entrevernes*.—In ascending to Leschaux from the Pont de la Charnia, about $\frac{3}{4}$ hr. above the bridge, a path turns off to the rt. at the hamlet of Entrèves, leading to Bellecombe, and thence to the *Col d'Entrevernes*, a low pass at the head of a glen containing the single small village of *Entrevernes*. The mule-path which

crosses the Col joins the road to Annecy at Duingt, the most picturesque point on the shores of the lake.

3. *By the Col de Cherel*.—At École, in the upper valley of the Chéran (Rte. I), a valley opens towards the NE., which leads by the village of Jarsy to the *Col de Cherel*, between the Mont Trélod and the Rocher d'Aréalin. The first-named mountain is sometimes ascended for the sake of the view, and is interesting to the botanist for the rare plants, such as *Cephalaria Alpina*, *Pedicularis Barrelieri*, &c., that have been found there. From the Col the glen descends nearly due N. to *Chevaline* and *Doussard*, villages standing near the S. end of the Lake of Annecy, and close to the road which runs along its western bank (§ 12, Rte. B).

SECTION 11.

TARENTAISE DISTRICT.

THE name Tarentaise properly belongs to the upper valley of the Isère, above Hôpital Confians, with its tributary valleys. The most considerable of these—the valley of the Doron—drains most of the higher summits of the range of high Alps separating the Isère from the Arc. The first of these rivers rises on the N. side of the Col d'Iséran, while the principal source of the Arc is close to the southern side of the same pass, and both streams unite at Chamousset, about 45 m. in a direct line W. of the Col. The Alpine group in question is therefore perfectly defined, and connected with the main range of the Graian Alps only at a single point by the isthmus-like ridge of the Col d'Iséran. It is to this group, and to the main valley of the Isère, from Chamousset to its source, that we restrict the present section, under the denomination Tarentaise district; the greater part of it being included in that province of Savoy. From its source to Aiguebelle,

near to its junction with the Isère, the Arc describes a semicircle whose diameter is about 40 m. in length. The Isère, on the contrary, in the interval between its source and the junction, forms a tolerably regular zigzag, or reversed w, whose re-entering angle, where stands the town of Moutiers, is pretty near to the centre of the semicircle formed by the Arc. The direction of these successive joints of the valley of the Isère appears to be intimately connected with the forces that have elevated this portion of the Alps; but as regards the position of the principal peaks, and the direction of the secondary valleys, no part of the Alps shows so little trace of regularity as this district. The reason may probably be that it is mainly composed of slightly altered sedimentary rocks, which have yielded so extensively to the action of the elements, and especially that of ice, as to preserve little trace of their original conformation.

The higher portions of the Tarentaise Alps have hitherto been very imperfectly known, and very ill depicted in the general maps published by the War Department at Turin. Even in Joanne's 'Guide to Savoy,' the latest and best work upon this part of the Alps, to which the editor is indebted for much useful information in regard to the more accessible districts, the errors of preceding writers have been repeated, and in some respects aggravated. Without adverting to the singular series of errors by which a peak which has no real existence came to be represented on nearly all existing maps, and to have ascribed to it a height exceeding 13,000 feet (see Rte. B), it suffices to say that the highest summit properly belonging to the Tarentaise has been placed on the maps in a completely false position, and under a name (*Aiguille de la Vanoise*) by which it is unknown to the natives of the district. It is to the enterprise and perseverance of Mr. William Mathews, jun., a well-known member of the Alpine Club, that we owe the first accurate account of the higher peaks of this group. In addition

to his valuable paper in 'Peaks, Passes, and Glaciers,' the editor has received from that gentleman further important information, obtained by him in a subsequent visit to the same district, during which he reached the highest summit of the Mont Pourri. It is now known that the culminating point of this group is the *Grande Casse* (12,780'), lying N.E. of the Col de la Vanoise; next in height is the *Mont Pourri* (12,491'), between the Val Pesey and Ste. Foi; while the third peak is the *Dent Parassée* (12,137'), W. of Termignon. The two first have been ascended by Mr. Mathews; the last has not yet been attained, though probably not very difficult of access. The accommodation available for strangers in this district is but indifferent, and is especially bad at the head of the valley of the Isère, which would infallibly become one of the favourite resorts of mountaineers if decent quarters were to be found there. The occasional passage of strangers has as yet produced no other effect than to create a general desire to extract as large a sum as possible from the pocket of the next traveller. Though the inn is far from good, Pralognan is, on the whole, the most eligible place for a mountaineer's head-quarters. (See Rte. E.)

The geological structure of the Tarentaise Alps has given rise to discussions which have gone near to shake the very foundations of the science. The reversal of the natural order of superposition in strata that have been extensively disturbed is a phenomenon not very uncommon in the Alps, but nowhere has it taken place so extensively, and under such singular circumstances, as in this part of Savoy. Between the zone of crystalline rocks extending from St. Maxime de Beaufort to the valley of the Romanche, and the still more considerable metamorphic mass of the Graians, rocks of varied mineral composition, chiefly belonging to the carboniferous series, fill the greater portion of the area which once apparently formed a trough, but where by subsequent disturbance they have been raised more than

12,000 ft. above the sea-level. Beds of anthracite, often thick enough to be worked for fuel, are extremely frequent throughout this formation, and are often associated with black argillaceous slates, abounding in impressions of ferns, either identical with, or nearly allied to, undoubted carboniferous species. In the midst of the carboniferous zone a narrow strip of liassic rocks, containing belemnites and other characteristic fossils, runs parallel to the general strike of the strata, from N.E. to S.W., and by the peculiarity of its relations with the earlier formations has raised doubts in the minds of some geologists as to the value of paleontological evidence in the identification of strata. Sometimes the carboniferous rocks appear bodily to overlies the lias, sometimes a thin bed of the former appears intercalated in conformable stratification between two of the latter. An instance of the latter phenomenon, which was first noticed by Elie de Beaumont, and has been since constantly visited by geologists, is seen near to the high-road from Albertville to Montiers (Rte. A), in the bed of a torrent a short way above the village of Petit Cœur, near to the junction of the crystalline with the sedimentary rocks. M. Mortillet has called attention to a neighbouring locality at La Cudraz, near Briançon, on the S.W. side of the Isère, where both carboniferous and secondary rocks are involved in the folds of the metamorphic crystalline slates.

ROUTE A.

CHAMBÉRY TO BOURG ST. MAURICE.

	Kilomètres	Eng. miles
Montmélian (by railway)	14	8 $\frac{3}{4}$
Chamousset	14	8 $\frac{3}{4}$
Albertville (by road)	22	13 $\frac{1}{2}$
Montiers	28	17 $\frac{1}{2}$
Aime	15 $\frac{1}{2}$	9 $\frac{3}{4}$
Bourg St. Maurice	14 $\frac{1}{2}$	9
	108	67 $\frac{1}{2}$

From Chambéry to Chamousset (§ 7

Rte. A) three trains run daily on the Victor Emmanuel rly. A line from thence to Albertville and Annecy is projected. An omnibus, corresponding with each train, plies to Albertville in $2\frac{1}{4}$ hrs., and at 1 P.M. a diligence starts, which reaches Moutiers at 6. A traveller may proceed on the same evening to Bourg St. Maurice with the courier, who arrives there at 11 P.M.

After crossing the Isère the new road runs along the embankment which retains the rt. bank of that river. To the l., at the base of the mountain, is the old road from Montmélian, traversing the village of *Grésy*, which abounds in Roman remains. To the NW. the valley is enclosed by the rugged ridge which divides the Combe de Bellavaux (§ 10, Rte. K) from the Isère. About 4 m. from Albertville the new road, which is hot, dusty, and disagreeable for the pedestrian, joins the old road near the point where the path to Faverges by the Col de Tamié turns to the N., and another less frequented track goes by the Haut du Four to Bellavaux.

Albertville (Inns : Balances, well spoken of; Nord, not recommended; H. de Londres; Parfaite Union) is the modern name given by the late King Charles Albert to two small towns standing on the opposite banks of the Arly, close to its junction with the Isère. The name is, however, usually confined to the town on the rt. bank of the Arly, formerly called Hôpital, while its opposite neighbour, *Conflans*, built on the slope of a hill, is still generally known by its ancient name. The road to Moutiers, after crossing the Arly, passes under Conflans, leaving on the rt. hand the extensive smelting houses where the ore from the mines of Macot and Pesey is reduced. Having hitherto followed the direction of NE., it now bends to the SSE., and about 4 m. from Albertville runs close under the ancient castle of *La Bathie*. The valley here contracts to a narrow gorge, and to sustain the road the embankment has encroached on the bed of the Isère. Just before reaching *La Roche Cevins* (Inn :

Croix Blanche), 8 m. from Albertville, a bridge across the Isère leads to the village of St. Paul, on the l. bank, and a path leads to Aiguebelle (§ 7) by the *Col de Basmont*. From *La Roche Cevins* the road is carried through a very beautiful part of the valley, and nearly 2 m. farther reaches a defile called *Pas de Briançon*, formerly commanded by two castles, now in ruins. Under the *Châteaux de Briançon* a bridge of a single arch spans the river, here contracted to a torrent. About 2 m. farther, after leaving the defile, the road passes near to a fine waterfall of the *Glaïse*, along which stream the path from the Col de la Louze (§ 12, Rte. G) descends to the hamlet of *Petit Cœur*. This part of the valley is interesting to the botanist as well as the geologist. Amongst other scarce plants, *Carlina nebrodensis* has been found near the Châteaux de Briançon, and *Achillea nobilis* is abundant near Moutiers. A pedestrian should take the old road, which is better shaded and more picturesque, in preference to the new one, which avoids the hamlet of *Grand Cœur*, opposite to the glen which mounts SW. to the Col de la Madeleine (Rte. I). After passing *Aigueblanche*, 8 m. from *La Roche Cevins*, the road ascends above a gorge, the lower part of which is too narrow to give space for a passage, and then descends to Moutiers, often called, for the sake of distinction,

Moutiers Tarentaise (Inns : Couronne, indifferent but apparently the best; H. des Diligences), formerly the chief town of the province of Tarentaise, standing at a height of about 1,600 ft., at the junction of the Doron with the Isère. The cathedral, though in part very ancient, does not appear interesting. The passes leading from Moutiers to the valley of the Arc are described in Rtes. E, F, G, and H. Those who wish to make a halt in this neighbourhood will find better quarters at Brides les Bains (Rte. E) than at Moutiers.

Less than a mile S. of the town are

the salt-springs of *Salins*, where there is a small bathing establishment, and an hotel (*des Bains*), where about thirty patients are usually found during the season. The water contains a considerable proportion of common salt and sulphate of lime, along with a moderate quantity of carbonate of lime and other salts. The chief utility of the springs arises from the salt-works, wherein culinary salt is extracted in large quantities. This operation, carried on in a large building close to the town of Moutiers, deserves examination. The process is of the simplest kind, yet quite effectual. The water from the springs is conducted through a long succession of sheds through gutters, from which it is allowed to drop slowly over faggots of thin twigs, and is finally brought into a building, where it trickles down a vast number of cords arranged vertically in frames. The effect is to deposit on the branches of the faggots and the cords the greater part of the calcareous salts which it holds in solution, and to produce a highly concentrated solution of common salt, which is then evaporated with a comparatively trifling expenditure of fuel. When the deposit of stalactitic matter has become excessive, the faggots are renewed, and the cords cleaned of their load by a few blows of a mallet.

The salt-springs of *Salins* rise at the S. base of the *Roc du Diable*, a peak immediately E. of Moutiers. The view from the summit (about 8,200') is said to be very fine. It may be reached without difficulty in about 4 hrs. from the town, and if the traveller be bound for Bourg St. Maurice, he may descend from the top by the N. slope of the mountain to the high-road opposite St. Marcel.

A diligence plies between Moutiers and Bourg St. Maurice, but it starts at an inconveniently early hour—3.30 A.M. The charge (to a stranger) for a one-horse carriage is 25 fr. Above Moutiers the Isère makes a second acute angle, resuming its original direction from NE. to SW. The road, which throughout the valley keeps to the rt. bank, at

first enters a narrow gorge overlooked by a castle belonging to the Bishop of Moutiers; then, as the valley opens, it passes the village of *St. Marcel*, till at a second still narrower defile, called *Dé-troit du Ciel*, where *roches moutonnées* attest the former passage of a glacier, it has been necessary to mount the rocky slope to a height of 800 or 900 ft. above the Isère. In the next open basin, amid vineyards and fine trees, the small village of *Centron* has preserved the name of the original inhabitants of this district. To the S. is seen the summit of the *Mont Jovet* (8,373'), said to command a still finer view than the *Roc du Diable*. A path over the shoulder of the former mountain leads to Bozel (Rte. E) in 4 hrs. After passing *Villette* the road reaches *Aime* (Inn: *Au Petit St. Bernard*), anciently *Axuma*, one of the chief towns of the *Centrones*, still containing many Roman remains. For the pass to Beaufort by the *Col du Cornet*, see § 12. On the opposite side of the Isère is the village of *Macot*, whence it is a walk of 2 hrs. up the valley which opens to the S. to the extensive *Mines of Macot*. Paths lead from the mines into the *Val Pesey*, and also to *Champagny* (Rte. C).

Above *Aime* the valley is somewhat bare, and about 4 m. farther, at the village of *Bellentre*, the last vines are seen. On the opposite side of the river, through the opening of the *Val Pesey* (Rte. C), there is on one side a fine view of the snowy peak of the *Mont Pourri*, and on the other of the range separating the *Val Pesey* from the *Val de Prémou*. Approaching Bourg St. Maurice, the pass of the *Little St. Bernard* comes well into view, and appears to be the natural termination of the valley of the Isère. After passing a wide torrent from the N., at about 9 m. from *Aime*, the road reaches

Bourg St. Maurice (Inns: *H. des Voyageurs*, fair accommodation, but charges unreasonable; *H. Royal*), a small town (2,792'), where the meeting of the routes from *Aosta* by the *Little St. Bernard*, from *St. Gervais* by the

Col du Bonhomme, and from Lanslebourg by the Col d'Iséran, with the main road of the valley of the Isère, produces a considerable amount of traffic.

ROUTE B.

BOURG ST. MAURICE TO LANSLEBOURG, BY THE COL D'ISÉRAN.

	Hrs.' walking	Eng. miles
Sainte Foi . . .	2 $\frac{1}{4}$	8
La Thuile . . .	2 $\frac{3}{4}$	2 $\frac{1}{2}$
Brévières . . .	2	6
Tignes . . .	1	3
Laval . . .	1 $\frac{1}{2}$	3 $\frac{1}{2}$
Col d'Iséran . . .	2	5 $\frac{1}{2}$
Bonneval . . .	3	7 $\frac{1}{2}$
Bessans . . .	1 $\frac{1}{2}$	5 $\frac{1}{2}$
Lanslebourg . . .	2 $\frac{1}{2}$	8
	16 $\frac{1}{4}$	49 $\frac{1}{2}$

This is a very interesting route, the scenery of the Upper Isère, especially below Tignes, being very beautiful; but it is subject to the serious drawback of the utter want of decent accommodation throughout the long distance between Bourg St. Maurice and Lanslebourg. A tolerable inn at Tignes is one of the greatest desiderata for mountaineers in this part of the Alps.

After passing a square tower, said to date from the 4th century, the road leading from Bourg St. Maurice to the pass of the Little St. Bernard crosses first the Versoie torrent descending from the Col de Bonhomme, and then the Récluse, which flows from the first-named pass, and reaches the village of *Scez* (2,953'), where the upper valley of the Isère, turning first E. and then SSE., marks the boundary between the main chain of the Graian Alps to the E. and the Tarentaise group to the W. A frequented mule-path carried along the rt. bank of the Isère, amid scenery continually increasing in beauty and grandeur, traverses the village of *Longefoy*, passes within sight of several other villages and hamlets, and after a rather steep ascent, in 2 $\frac{1}{2}$ hrs. from Bourg St. Maurice reaches

Sainte Foi (Inns: H. du Mont Blanc,

poor enough, but not so bad as Tignes—fleas in abundance; several other inns appear still more mean and dirty), beautifully situated (3,209') above the junction with the Isère of a torrent which drains a portion of the glaciers of the Ruitor and the N. side of the *Ormelune*. (For the passes leading to the Val Grisanche, see § 15, Rte. C.) Nearly opposite to Ste. Foi is the magnificent peak of the Mont Pourri, sometimes called Chaffe Quarre, the second in height of the Tarentaise Alps (see Rte. C), rising in one unbroken mass from the bank of the Isère to the height of 12,491 ft., and forming the most conspicuous object throughout this part of the valley. About $\frac{3}{4}$ hr. farther up the valley is *La Thuile de Ste. Foi*, with an inn (H. des Voyageurs) not quite so poor as those at Tignes, but dirty and extortionate. François Ruet, a chamois hunter and fisherman, lives here, and though no longer a young man, would be useful as a guide to the neighbouring mountains. Game of all kinds is abundant here, and bears are not uncommon. [From this village an agreeable and easy excursion may be made to the *Croix de Feuillette*, one of the minor peaks of the *Ormelune*, commanding a very fine view of the range of Mont Blanc and the nearer Alps of Savoy. It is probable that the highest point of the *Ormelune* (10,833') may be accessible from this side. The most agreeable way to return to La Thuile is by the track leading from the Col du Clou. The scenery in descending towards the Isère is varied and beautiful.]

Above La Thuile the mule-path to Tignes mounts through a forest, at a considerable height above the valley. A very striking position is that of the hamlet of La Gure, standing just below an impending glacier of the Mont Pourri, which from time to time launches against it masses of ice and rocks. Farther on, near the hamlet of Bioley, the traveller crosses a torrent fed by one of the largest glaciers of the *Sassière*, and forming a fine cascade close to the bridge. After crossing another ridge, the path descends to

the level of the Isère, and soon reaches a green basin where stands the village of *Brévières*, with a poor cabaret. Among many interesting plants found in this part of the valley, the botanist will observe the beautiful *Cortusa Matthioli*, growing on steep damp rocks near the banks of torrents. On the W. side of the valley the ravine of La Sache leads by the Col of the same name to the Val Pesey (Rte. C). A little farther S. is the pleasant Alp of Marai, worth a visit for its noble view of the Mont Blanc range. Thence the traveller may reach the Lac de Tignes without re-descending to the valley. Beyond Brévières the path to Tignes crosses the Isère by a wooden bridge, mounts through a pine forest along the mountain-side, in order to avoid an impassable ravine through which the stream forces its way, then descends nearly to the bank, until in 1 hr. from Brévières the valley opens out again at the mountain village of

Tignes (5,415'), standing on a grassy plain at the junction with the Isère of the torrents from the Lac de Tignes and the Lac de la Sassièrè. Here are two inns, one kept by Constant Arnaud, the other by Florentin Révial, both equally poor and dirty, but at the first-named some degree of civility and attention, and a rather less extortionate bill, may be found. The position of Tignes is very beautiful and attractive to the mountaineer. At the foot of the *Aiguille de la Sassièrè*, and in immediate connection with no less than 8 high passes, leading into as many different valleys, it requires nothing but a decent inn to make it a frequent resort of Alpine travellers. The passes leading from hence are—1. Col de la Gailletta to Val de Rhêmes. 2. Col de Galèse to the Valley of the Orco. 3. Col de l'Iséran to Lanslebourg. 4. Col de Larossor to the valley of the same name. 5. Col de la Leisse to Entre-deux-Eaux. 6. Col du Palet to Champagny. 7 and 8. Col de Tourne, and Col de la Sache, both leading to Val Pesey. The two first are described in Chap. V., and the

last five are noticed in the two next Rtes. [The most interesting excursion to be made from Tignes is the ascent of the *Aiguille de la Sassièrè*, moderately easy of access to practised mountaineers, and commanding one of the finest panoramic views in this part of the Alpine chain. An account of the ascent is given by Mr. Mathews in the second series of 'Peaks, Passes, and Glaciers.' Having crossed the Isère, he mounted by the S. side of the fine waterfall opposite the village, formed by the torrent descending from the Lac de la Sassièrè. Above the fall the torrent is crossed by a wooden bridge, and a path leads into an upland glen, in the centre of which lies the *Lac de la Sassièrè*. Looking up the glen to a large glacier which appears to close its upper end, over which lies the way to the Col de la Gailletta (§ 15), the *Aiguille* is seen on the l. hand, presenting a range of steep rocks surmounted by a cornice of snow, and rising into a dome of snow at its further or E. extremity. At the W. end towards Tignes is a buttress of the mountain, connected by a snowy arête with the snow cornice above mentioned. Ascending by the western buttress, Mr. Mathews, with his guide, Michel Croz of Chamouni, gained the upper snow calotte by a notch in the ridge, and then without further difficulty, reached the summit, 12,326 ft. in height, taking a mean of the nearly concordant barometric measurement of Mr. Mathews, and the trigonometric measurement by M. Corabœuf. The summit had been reached about 40 years before by a native of the valley, who had erected a cross, of which some fragments were found by Mr. Mathews. In a favourable state of the snow, it is easy to descend, in great part by *glissades*, over steep snow-slopes on the side of the mountain towards Brévières. By that way Mr. Mathews effected the descent in 2 hrs. 5 min.]

The valley of the Isère between Ste. Foi and the Col d'Iséran is sometimes called *Val de Tignes*, and, in addition to its other attractions, is interesting to

the geologist, as marking the limit between the crystalline rocks of the Graian range and the sedimentary strata of the Tarentaise, and to the botanist, because of the many rare Alpine plants which it produces. Among others may be mentioned *Draba frigida* and *D. nivalis*, *Oxytropis Gaudini*, *Gentiana punctata*, *G. brachyphylla* and *G. tenella*, *Pedicularis rosea* and *P. cenisia*, *Primula pedemontana* (on the rt. hand of the path approaching Tignes from Brévières), *Carex rupestris*, *C. microglochin*, *C. curvula*, *C. lagopina* and *C. bicolor*, *Alopecurus Gerardi*, and *Avena subspicata*. Between the plain of Tignes and the next and highest basin-like expansion of the valley, is a defile even grander than those lower down, and so narrow that the path has to be carried to a great height above the torrent. After crossing back to the l. bank, this leads, in $1\frac{1}{4}$ hr., to the plain of Laval—the short name for La Val de Tignes—the highest village in the valley; the houses, including a so-called inn with two beds, are miserable and filthy in the extreme, so that this is quite as bad a halting-place as Tignes. A path from hence mounting to the W. joins the track from Tignes to the Col de la Leisse, and another, rarely used, leads to Entre-deux-Eaux by the Col de Larossor. The way taken to the Col d'Iséran usually passes a group of houses called Fornet, whence lies about due E. the way to the Col de Galèse (§ 14); but it is shorter to ascend by the l. bank of the Isère, now reduced to a mountain stream, by a succession of moderately steep zigzags. In less than an hour above Laval, the traveller will see the first of a line of stone pyramids, which serve not only to direct wayfarers when snow lies on the pass, but also to give shelter in bad weather; each of them being fitted with a niche that holds two or three persons. In approaching the summit of the pass, the traveller who has studied the ordinary guide-books* and the most

authentic maps will naturally expect to obtain a view of the *Mont Iséran*, which he will have seen described as the giant of this part of the Alps, 13,271 feet in height, and giving birth from its glaciers to the rivers Isère, Arc, and Orco. It does not require much experience in mountain countries for the traveller, using his own eyes, to assure himself that no great peak lies close to the pass. The existence of a pass implies of course that eminences of some description lie on either side of it. Such exist both E. and W. of the Col d'Iséran, and the highest point to the E. of the pass, occupying the position of the *Mont Iséran* of the maps, was visited in 1860 by Mr. Cowell, who has published his notes of this excursion in 'Vacation Tourists.' The ground being very rough, it takes about $1\frac{1}{2}$ hr. from the Col to reach this summit, which is about 1,600 ft. above the pass, or rather less than 10,800 ft. above the sea-level. It commands a fine view in the direction of *Mont Blanc*, but is completely overlooked by the ranges which lie to the E. and the NW.

To explain the singular errors connected with the imaginary peak of the *Mont Iséran*, it is necessary to call to mind the fact, that although the passes over the Alps which have long been known and used acquired early the names which they still retain, very few of the higher summits obtained fixed and recognised names until comparatively recent times. Even at present, although every frequented pass is well known by its name to the natives of the neighbouring valleys, they are often quite uncertain as to the names of high peaks which they never think of attempting to ascend. All the ancient

for Switzerland, Savoy and Piedmont,' preserves a judicious silence respecting the *Mont Iséran*, but a recent and justly esteemed work—'Itinéraire de la Savoie,' par Adolphe Joanne—not only abounds with references to this imaginary peak, but gives in connection with the Col d'Iséran an account of the ascent of the mountain, and of the view from the summit, which is a remarkable illustration of the effect of a strong prepossession, aided by a lively imagination, in distorting the testimony of the senses.

* The latest edition of Murray's 'Handbook

passes in the western Alps received the descriptive name of 'Mons' or 'Mont,' e.g. Mont Genève, Mont Cenis, Mont St. Bernard, Mont Moro, Mont St. Gothard, and many others; and in like manner the ancient pass leading from the Maurienne to the valley of the Isère was called Mont Iséran, by which name the pass is now known to the natives of the adjoining valleys. Geographers, and other writers who have treated of the Alps with little or no local knowledge, have been constantly misled in the attempt to identify one or other of the neighbouring peaks with each of the names above cited. In all the other instances referred to it has gradually become clear that no peak existed bearing the name Mont Genève, Mont Cenis, &c.; but the neighbourhood of the Col d'Iséran being little known, the error survived much longer. It so happened that three high peaks—the Grand Paradis, the Levanna, and the Aiguille de la Sassièrè—whose summits, 12 or 13 miles apart, form a nearly equilateral triangle, are so placed that, when seen from a distance, one or other of them pretty nearly coincides with the supposed direction of the Mont Iséran, and have thus helped to keep up the popular delusion. The first of these, which is the highest, and that best seen from the neighbourhood of Turin, was measured trigonometrically by Colonel Corabœuf, and that measurement is the authority for the supposed height of the Mont Iséran. The second summit has usually represented the imaginary peak, when viewed from the W. and SW.; while the Aiguille de la Sassièrè has played the same part in views from the N. and NE. It is needless to say that if a map of this part of the Alps founded on actual survey were in existence, so gross an error could not have so long held its ground; but unfortunately the general map of Piedmont and Savoy, published by the War Department at Turin, has no claim to be admitted as the bonâ fide result of even a rude survey of the higher Alps. The officers under whose direction it has been pro-

duced have not even turned to account the limited, but valuable, materials already in existence, which were published by the Scientific Commission for the measurement of the parallel of latitude between Lombardy and France. Some doubt in regard to the Mont Iséran of the maps had previously existed in the minds of Alpine travellers; but it is to three members of the Alpine Club—Messrs. Cowell, W. Mathews, and Tuckett—that the public are indebted for the complete demolition of an unqualified pretender to Alpine honours, and for a correct knowledge of the three genuine peaks whose claims had hitherto been unduly estimated.

The Col d'Iséran, in height, according to the mean of several observations, 9,175 ft., is reached in 2½ hrs. ascending from Laval. To enjoy at once the entire view, it is well to mount for a short distance on either side, as from the actual Col the view to the S. is limited; but after descending a very short way, a grand range of peaks and glaciers, extending from the Levanna to the Roche Melon, comes into view. The downward track lies for some way over bare Alpine slopes gradually contracting towards a ravine, through which the path descends very steeply. About half way from the top to the valley of the Arc several clusters of chalets are passed, and then again the descent becomes rapid and fatiguing. To the l., at mid-height of the Levanna, the main source of the Arc is seen to break out from the face of the mountain. More than 3 hrs. are needed for the ascent from Bonneval to the Col, but the descent may be made in 2 hrs. or even less. [For those who may wish to vary the way from Laval to Bonneval, there is another pass lying W. of the Col d'Iséran, called *Col du Fond*, not much higher or more difficult than the ordinary route. It would be advisable to take a guide for this way, as the pass is very rarely used.]

Bonneval (6,000'), the highest village in the valley of the Arc, has a very poor inn with two tolerable beds, kept by Jean

Culets, a civil and attentive landlord, who is at the same time an excellent guide. He accompanied Mr. Cowell to the summit of the Levanna, and is acquainted with several of the difficult passes leading into Piedmont (see § 13). To escape the severe cold of winter, the natives partially excavate the ground floors of their houses, and live in a single room, which serves also during that season as a stable for their cattle and other domestic animals.

On leaving Bonneval, the track crosses the Arc by a stone bridge, which seems out of character in so rugged and poor a place, and follows the l. bank of the stream through a wild defile which continues for about 2 m.; then, after passing some wretched hamlets, the valley widens out, and about 3 m. farther the opening of the Combe de l'Averole, through which lie several passes to the valley of Lanzo, is seen on the l. In $1\frac{1}{2}$ hr., descending, the traveller reaches *Bessans* (Inn, poor and extortionate, but good honey and cheese are had here), whence the summit of the Roche Melon may be reached in $5\frac{1}{2}$ or 6 hrs. (§ 7, Rte. B). After passing *Lans-le-Villard*, where a path mounting to the l. joins the road of the Mont Cenis, a walk of $2\frac{1}{2}$ hrs. from Bessans conducts the traveller to Lanslebourg (§ 7). A mule and guide from Lanslebourg to Bonneval may be hired for 5 frs.; and an active pedestrian, starting very early, and using this conveyance, may reach Bourg St. Maurice (on foot from Bonneval) on the same day.

ROUTE C.

TIGNES TO MOUTIERS TARENTEISE, OR BOURG ST. MAURICE, BY THE COL DU PALET—ASCENT OF THE MONT POURRI.

$2\frac{3}{4}$ hrs. to the Col du Palet. 9 hrs. thence to Moutiers. 7 hrs. to Bourg St. Maurice by Val Pesey.

In its downward course from Tignes

to Moutiers, the Isère makes a long detour to the N., in which it flows round the base of the great ridge whose highest summit is the Mont Pourri. A more direct course from Tignes to the valley of the Isère lies over the Col du Palet, a comparatively low pass, easily accessible from Tignes, which leads either W. through the Val de Prémou to Moutiers, or NNW. to the Isère between Aime and Bourg St. Maurice.

A brawling stream, descending immediately to the W. of Tignes, flows from the *Lac de Tignes*, a rather large lake, 60 or 70 acres in extent, lying in a shelf or hollow of the mountains, about 1,500 ft. above the village. The chalets near the lake may be reached in $1\frac{1}{2}$ hr., ascending by a tolerable mule-path. Should the traveller be able to secure from the fisherman some of the fine trout of the lake, which are sent during the summer to Courmayeur and St. Didier, they may make up for the deficiencies of the usually empty larders of the inns at Tignes, Laval, &c. The path to the *Col du Palet* mounts a little S. of W. from the lake, and leads without difficulty to the top in about $1\frac{1}{2}$ hr. In descending, Tignes may be reached in 2 hrs. from the Col. The Col leads to an undulating plateau, which descends on the one hand to the Val Pesey, and on the other to the Val de Prémou; and when clouds lie on the pass, it appears to be no easy matter to preserve the right direction.

1. To reach Moutiers it is necessary to pass on the S. side of the little *Lac de Cracalery*, about the level of the Col, and thence to ascend for a few minutes SW. to the *Croix de Frêtes*, which is the culminating point of this pass. The descent through the Val de Prémou is long, and not very interesting. After passing three small tarns the path winds along the N. slope of the valley, passing along an alp called La Grande Plagne, and then descends more steeply by zig-zags to the bank of the torrent near to a large chalet. Here the track crosses to the l. bank, which it follows for several miles, till, on approaching Cham-

pagny, it returns to the rt. bank, and ascends to the terrace on which that village stands, opposite to the opening of the valley of Pralognan (Rte. E).

Champagny, a rather large village, in the midst of very agreeable scenery, has preserved the national costume better than in most parts of the Tarentaise. It is reached in 5 hrs. descending from the Col du Palet, but 6 hrs. are required for the ascent. From hence there is a good road, which descends rather steeply to *Bozel* (Rte. E), a large village with two inns, 3 m. below Champagny, and about 4 m. above Brides les Bains, or 8 m. from Moutiers (Rte. A).

2. If bound for the Val Pesey, the traveller commences the descent at once from the Col du Palet, turning about due N., and leaving on his l. hand the Lac de Cracalery. In rather more than an hour he may reach the châlet of Autre Lai (or Estralet?), near to a small lake of the same name. From this châlet a path mounts SW. to the *Pas de Valgeret*, by which Champagny is reached in 1 hr. less than by the Croix de Frêtes. In the opposite direction is the *Col de la Sache*, leading to Brévières, which has been traversed by Mr. W. Mathews. It does not appear to be much shorter, while it is certainly rougher, than the Col du Palet. A third pass, called *Col de Tourne*, lies between the latter and the Col de la Sache, and probably offers the most direct way from Autre Lai to Tignes.

The head of the Val Pesey is wild and solitary, enclosed between the lofty range of the Mont Pourri to the E. and a glacier-clad mass which separates it from the Val de Prémou, one of whose highest summits has the common name Aiguille du Midi. Nearly 4 hrs. are required from the Col to reach the *Mines of Pesey* (6,024'), formerly very productive, but of late years considerably fallen off in importance. As at the neighbouring mines of Macot, the ore is an argentiferous sulphuret of lead. The direct track from the mines to Bourg St. Maurice descends along the rt.

bank of the torrent for 1 hr. to the hamlet of Moulin, leaving the village of *Pesey* on a height to the rt. hand. [At Moulin a tributary stream descends from the SSW. through a wild valley, through which a track leads past the hamlet of *Pramain* to a Col, by which Champagny is reached in 5 hrs.] From the junction of the two torrents it is an easy walk of 1 hr. to *Landry*, where the Val Pesey opens into the valley of the Isère. Following the char-road, it is a walk of nearly 1½ hr. from Landry to Bourg St. Maurice; but there is a path which crosses the Isère by a foot-bridge, and leads to the town in 1¼ hr., rather more than 3 hrs. from the mines and 7 hrs. from the Col du Palet. Should the traveller be bound for Aime, he should enquire for a path leading from Moulin to Bellentre (Rte. A), by which Aime may be reached nearly as soon as Bourg St. Maurice.

Ascent of the Mont Pourri. The Mont Pourri, also called Chaffé Quarre, and Mont Thurria, is the noble peak which is so conspicuous from the W. side of the pass of the Little St. Bernard, and throughout a considerable part of the upper valley of the Isère. Rising boldly as it does to a height of from 9,000 to 10,000 ft. above the Isère, there are few peaks in the Alps which present a more imposing aspect. The ridge of the mountain, running for 8 or 10 m. parallel to the Isère and the Val Pesey, which drain its E. and W. flanks, consists of a central highest peak, flanked on either side by two attendant summits. The southern of these, which stands opposite to Brévières in the Val de Tignes, was reached by Messrs. Mathews and Jacomb in 1861, and was found by them to be 11,769 feet in height, but about 2 m. to the NNW. the middle peak was seen to rise much higher, and on that side appeared very difficult of access. At the suggestion of Mr. Mathews, one of his guides, Michel Croz of Chamouni, attempted the ascent later in the same year, and succeeded in reaching the highest peak alone. In the following year Mr. Mathews, ac-

accompanied by the Rev. T. G. Bonney, with Michel and Jean Baptiste Croz, effected the second ascent. Starting from Bourg St. Maurice, they went in the first instance to the village of *Pesey*, where refreshment, but no fresh meat, is to be found at a little inn (*A la Réunion des Bons Amis*), about $1\frac{1}{4}$ hr. above Landry. Near the village a stream descends from the E. to join the main valley, and leads in $2\frac{1}{2}$ hrs.' easy walking to the châteaux of *Entre-deux-Nants* (6,840), situated, as the name imports, at the junction of two torrents. The party passed the night at one of these châteaux, belonging to Baudin, the inn-keeper at Pesey. Starting next morning at 3.30 A.M., they followed an easterly course to the head of the glen, a plateau dotted with small lakes, divided from Bourg St. Maurice by a rocky ridge, and communicating with another glen which descends towards the Isère a little above Scez. Turning to the rt. towards the Pourri, they had before them a small glacier flanked on the l., or NE., by a rocky peak, and on the opposite side by slopes of débris, which they mounted, thus gaining, in 2 h. 40 min. from *Entre-deux-Nants*, a craggy ridge connecting the peak above mentioned with another higher summit, the third peak of the Pourri. From this Col, 9,620 ft. in height, which is the direct way from Pesey to Sainte Foi or La Thuile, they overlooked a wide glacier which descends towards the last-named village. At a point 250 ft. above the Col, commanding a noble view of the Pennine and Graian Alps, they halted for breakfast. Descending a few paces to the glacier, they next steered S. to gain the ridge which connects the highest peak with the third peak above mentioned, encountering a wall of snow about 20 ft. high, which formed the chief difficulty of the ascent. Having gained this second ridge, they had before them an immense amphitheatre of névé, which opens towards the Val Pesey. Above its SE. corner rises the highest peak of the mountain, which throws out a spur of rock towards the SW. Circling round the

head of the amphitheatre, they climbed by steep snow-slopes to the crest of this spur, and along it reached the base of the terminal cone. This was mounted from the S. side, partly by rocks and partly by snow-slopes. From the ridge where the party halted for breakfast, 3 hrs. 40 min. sufficed to reach the summit, commanding a magnificent panoramic view of the Western Alps. $2\frac{1}{2}$ hrs. were spent in observing with a theodolite the azimuths and zenith distances of the principal peaks, in strengthening the stone cairn which had been erected by M. Croz the previous year, depositing thereon a minimum thermometer, and in observing the mercurial and aneroid barometers, by which the height of the peak appears to be 12,491 ft. Returning by the same route in about 2 hrs. to the Col near which they breakfasted, they separated at that point in order to complete the exploration of the mountain. Mr. Mathews and J. B. Croz scrambled down a steep ravine by the side of glacier seracs, and then descended by shingle-covered ice to a sloping alp, whence, bearing to the l., they arrived without difficulty at *Villaroger*, a village opposite to Ste. Foi. A path leads thence along the l. bank of the Isère, and crosses to the mule-track from Ste. Foi to Scez, about half way between those places. Mr. Bonney descended from the Col towards the N. into the glen which reaches the Isère near Scez. About half way down the stream falls in cascades over a range of steep precipices, but a path leads to the l. and winds down the steep face of the mountain opposite to Bourg St. Maurice. Nearly 4 hrs. were occupied in the descent from the Col. The foregoing description has been condensed from an account of the ascent with which the editor has been favoured by Mr. Mathews.

ROUTE D.

TIGNES TO LANSLEBOURG, BY THE COL DE LA LEISSE.

10 hrs.' walking.

From the châteaux of the Lac de Tignes, mentioned in the last rte., a path turns to the l. about due S., and enters a gorge which leads to the *Col de la Leisse*. A short way below the Col this track is joined by another which mounts from Laval (Rte. B). The upper part of the gorge displays traces of glacial action, and even at the summit, which by the mean of different measurements is 9,127 ft. in height, the rocks are rounded and smoothed in the form characteristic of the passage of a glacier. A good deal of snow usually lies here, but the pass, which is reached in $2\frac{1}{2}$ hrs. from the lake, is recognised even in bad weather by an iron cross fixed to the summit of a boss of rock. The Vallon de la Leisse, into which the traveller now descends, is one of the wildest in the Alps. Along the valley and the slopes on either hand, nothing is seen but the traces of ruin and desolation—everywhere broken fragments, from the size of fine gravel to that of huge blocks; and even the snow which lies in hollows, and in several places bridges over the stream, is soon discoloured by the new rubbish that is constantly discharged from the heights above. Although everything looks bare and inanimate, the botanist may detect several scarce plants growing in the midst of the débris, amongst which *Alopecurus Gerardi* is abundant. One object alone presents an agreeable contrast to the dreary aspect of the glen. This is the peak of the *Grande Motte*, rising in a beautiful snowy pyramid W. of the Col probably to about 11,500 ft. It appears easy, and the ascent is recommended to future travellers, who should start early enough to leave themselves time for the purpose. In the midst of the débris through which the way lies down the valley, the path can scarcely be traced, but there is no other difficulty in ad-

vancing than the roughness of the ground. In less than 2 hrs. from the summit the Leisse torrent, descending from the Col, joins the stream from the Col de la Vanoise, about 1 m. above Entre-deux-Eaux. From those châteaux Lanslebourg is reached in 4 hrs. by the Plan du Loup, following the path described in the next rte.

ROUTE E.

MOUTIERS TARENTAISE TO LANSLEBOURG, BY THE COL DE LA VANOISE.

	Hrs.' walking	Eng. miles
Bozel . . .	$2\frac{1}{2}$	8
Planay . . .	$1\frac{1}{2}$	4
Pralognan . .	2	6
Col de la Vanoise	$2\frac{1}{2}$	6
Entre-deux-Eaux	$1\frac{1}{2}$	4
Termignon . .	3	9
Lanslebourg . .	1	3
	<hr/> 13 $\frac{1}{2}$	<hr/> 40

This is a very interesting route, leading through the very centre of the Tarentaise Alps. There is a good road from Moutiers to Bozel, and a rough char-road thence to Planay. A traveller not wishing to put up with the indifferent accommodation at Pralognan may take a vehicle to Bozel or to Villard Goîtreux, and thence reach Lanslebourg on foot in $11\frac{1}{2}$ or 12 hrs., allowing 1 hr. or $1\frac{1}{2}$ hr. for halts.

The carriage-road from Moutiers to Bozel keeps to the rt. bank of the Doron, and at 4 m. from the town communicates by a stone bridge with the opposite bank, where, near the junction of the *Combe des Allues* with the Doron, stands the pretty watering-place of

Brides les Bains (Inns: Pension des Bains, the chief hotel, and well kept; H. de la Couronne; and several others). The mineral springs were lost for more than a century, and again brought to light in 1818 by an inundation of the Doron, which washed away the earth and rocks by which they were obstructed. The waters are strongly impregnated with various salts, and should not be used either in drink or baths without medical advice. About

400 Swiss and Savoyard visitors resort hither every year. The charge for a room and diet is from 6 to 8 fr. daily. For tourists it offers the best accommodation to be found in this district, and a variety of excursions. The most agreeable way from Moutiers is by a path which, after passing Salins and crossing the Doron, follows the l. bank of the stream, mounts to the plateau of Villarlurin, and again descends to the level of the Doron, $\frac{1}{2}$ m. from the Baths. There is a good road from Brides to Bozel, better shaded and more picturesque than that by the rt. bank, but about $\frac{1}{2}$ hr. longer.

Bozel, a large village with two inns, lies at the S. foot of the Mont Jovet, opposite to a rocky pyramid called *La Dent*, which stands above the fork of the valley where the torrent of *La Rivière* joins the Doron. A track passing E. of the summit of the Mont Jovet leads in 4 hrs. to the mines of Macot (Rte. A), and in 2 hrs. more to Aime. [The two parallel valleys of *Allues* and *La Rivière*, which join the main valley of the Doron at Brides and Bozel respectively, would probably reward the pains of a mountaineer who should undertake to explore them, and the passes which may be effected from the S. end of each of them. The Combe des Allues is said to terminate in impassable glaciers—an expression which, as has been well observed, merely means that no one has yet attempted to pass them.]

Less than 1 m. beyond Bozel the road to Pralognan separates from that leading to Champagny (Rte. C), turns to the rt., and descends towards the bed of the Doron, which here issues from the SSW. At the junction of the main stream with the Prémou, 2 m. from Bozel, the village of *Villard Goîtreux* stands in the midst of beautiful scenery, but afflicted, like most of this neighbourhood, with the plague of goitre. Above the junction of the two streams the valley of the Doron presents a steep rocky slope, which must be surmounted in order to reach the upper level, which is often called Val de Pralognan. Through

this barrier the Doron has cut its way in an impenetrable ravine, where it descends in a succession of cascades. The old mule-path keeps as near as the ground will permit to the gorge of the Doron, or Gorge de Bellentre, while a new char-road is carried in zigzags up the slope. Either way is interesting to the pedestrian, the new road giving a fine view down the valley. No time is saved, but rather the reverse, by taking a vehicle beyond Villard, as the new road stops at the village of *Planay*, near the summit of the steep ascent. To reach that point, about $\frac{3}{4}$ hr. from the bridge over the Prémou ($1\frac{1}{4}$ hr. from Bozel) are required. The scenery here completely changes its character. The Doron flows gently through a nearly level valley, whose lower slopes, covered with pine forest, are surmounted by peaks of great boldness and variety of form. Leaving on the rt. hand two wooden bridges, which merely serve for access to the forests on the l. bank of the stream, the mule-path advances to a narrower part of the valley, leading to another ascending step of rock. After passing on the rt. the hamlet of *Ville-neuve*, about $\frac{1}{2}$ hr. above Planay, the Doron is crossed for the first time, and a steep ascent through pine forest immediately commences. After $\frac{1}{2}$ hr. the summit, marked by a large cross, is attained, and the path descends a little to the open pastures, where a bridge leads back to the rt. bank of the Doron. Some scattered houses are passed, and the path reaches some bosses of rock, rounded by the passage of ancient glaciers, until in 2 hrs. from Planay a sudden turn of the path discloses the village of *Pralognan* (4,700', W.M.), finely placed at the junction of the *Glère* torrent, descending from the Col de la Vanoise, with the *Doron*, which flows nearly due N. from the *Col de Chavière* (Rte. F). There are two small inns here, both poorly provided. In default of other requisites, Mr. Mathews found civility and moderate charges at that kept by Marie Joseph Favre, one of a cluster of houses above the church.

The inn 'Des Barges' has the preference in Joanne's 'Itinéraire.'

Pralognan is extremely well situated as head-quarters for a mountaineer who would explore the central mass of the Tarentaise Alps; and although much light has been thrown on the orography of the district through the exertions of Mr. W. Mathews, there is yet room for new and interesting expeditions amidst little-known peaks and glaciers. This central mass lies between the valleys of the Doron, which descends towards the N. from the Col de Chavière to Villard Goitreux, and the nearly parallel valley of the Leisse flowing in the opposite direction—from N. to S.—from the Col de la Leisse (Rte. D) to Termignon. To the N. this tract is limited by the Val de Prémou (Rte. C), and to the S. by the valley of the Arc from Modane to Termignon. This great mass, about 13 m. in length by 5 or 6 in breadth, presents on every side bold peaks and faces of rock, which are the sustaining walls and buttresses of a vast glacier plateau, of which, until lately, next to nothing was known. In one direction only it is easily traversed—namely, by the depression over which lies the track of the Col de la Vanoise, between Pralognan in the valley of the Doron, on the W., and Entre-deux-Eaux in that of the Leisse, on the E. Everywhere else it rises considerably above the limit of perpetual snow. It was known that one summit somewhere near to the Col de la Vanoise approached to 12,700 ft. in height; but the exact position of this peak, to which the name *Aiguille de la Vanoise* seems to have been given conjecturally, remained uncertain. Most maps have placed it immediately S. of the Col, while others omit it altogether. The six-sheet Piedmontese map does not profess to indicate the position of the Aiguille, but has the name 'Ghiacciaja della Vanoise,' extending over the whole glacier region between the Col and the Roche Chevreire.

The following conclusions have been established by the researches of Mr. Mathews:—

1. There is no peak known in the district by the name *Aiguille de la Vanoise*, and no high summit in the place where that supposed mountain has been represented on maps. The name should therefore be expunged.

2. The highest summit of the Tarentaise Alps, known at Pralognan as the Grande Casse, lies NE. of the Col de la Vanoise, between Pralognan and the head of the Val de Prémou. Its height, as determined by Mr. Mathews, is 12,780 ft., and to this peak applies the trigonometrical measurement by Corabœuf of the *Aiguille de la Vanoise*, his result being 12,674 ft.

3. To the S. of the Col de la Vanoise, a vast undulating plateau, exceeding 10,000 ft. in height, and covered with glacier or névé, extends for several miles, but only at its S. extremity rises into peaks of any importance. The two highest of these are the *Dent Parassée* (12,137'), and the *Roche Chevreire* (10,765'). When seen from a lower level, many of the projecting buttresses, which rise from the valleys of the Leisse or the Doron, appear to be conspicuous peaks, but with the exception of those already named, there do not appear to be any which rise much above the general level. In the absence of a local name for the plateau, it may properly retain the collective name, *Glacier de la Vanoise*, given in the Piedmontese map.

In going from Pralognan to the *Col de la Vanoise*, the path is so well marked, and the position of the Col so obvious, that in fine weather a guide is not required. The direction is at first E., and then ENE., following the l. bank of the *Glière* to a group of chalets, also called La Glière, $1\frac{1}{4}$ hr. from Pralognan, below which the track passes to the rt. bank. The rare *Dracocephalum Ruyschiana* has been found in the Vallon de la Glière, ascending from Pralognan. Above the chalets the scenery becomes wilder and more imposing. A pinnacle of rock, called l'Ouille (patois for l'Aiguille), is seen in the direction of the pass. The regular path, marked by

poles, keeps to its N. side, but it is also possible to pass it on the S. side. In about $1\frac{1}{2}$ hr. ascending from the châteaux the Col (8,190', W.M., 8,271', 'Le Alpi') is attained. From the summit the *Grande Casse* comes well into view, and it was from thence that in 1860 Mr. Mathews effected the ascent, with Michel Croz of Chamouni and Étienne Favre of Pralognan. [A short climb over rocks led them to easy snow-slopes, with a glacier descending on the rt. hand. Mounting these slopes, which are here and there broken by rocks, and gradually become more rapid, they finally reached the base of a steep and lofty slope of hard frozen snow, inclined at an angle of 45° . A laborious climb up this slope, requiring 800 steps to be cut with the axe, led them to a hollow which lies between the two peaks of the Grande Casse. That to the rt. is capped by a dome of snow easily reached; the l. hand and highest summit is more difficult of access. It is formed by a ridge or *arête* of snow, so extremely steep and sharp that the last few feet were deemed dangerously unsafe, and in order to obtain an observation with the barometer, Mr. Mathews found it necessary to descend to safer standing ground, 30 ft. below the summit. The ascent from the Col occupied 5 hrs., and the descent 4 hrs., exclusive of halts.]

After passing the Col de la Vanoise, the way to Entre-deux-Eaux lies for a long distance towards the SE., through a broad passage or trench which seems to have been cut through the steep and rugged peaks on either side. A succession of four small lakes, the highest and largest of which is the *Lac de l'Ouille*, lies on this comparatively level tract, the passage of which in bad weather is much feared by the natives, on account of the furious blasts which traverse it when the wind sets from the NW. After about 1 hr. from the Col, the path, which is throughout marked by poles, reaches the verge of a steep rocky slope, overlooking the junction of the Leisse with the torrent descending from the Col, called, like many other streams

in this district, Doron. The descent is rapid and rather steep, lying along the rt. bank of the torrent, which falls over the rocks in cascades. After the junction of the latter with the Leisse, the united streams, sometimes called *Leisse*, and sometimes Doron d'Entre-deux-Eaux, are crossed to reach the châteaux of *Entre-deux-Eaux*, where eggs, bread, and wine, and, in case of need, a bed, may be procured at a little inn or cabaret. The height of these châteaux is stated by Joanne to be 7,090 ft.—on what authority? Here the little-used track from Tignes by the Col de la Leisse (Rte. D) joins the present route, and a short distance S. from the châteaux the mule-path passes the torrent issuing from the valley of *Larossor*, through which lies a still more unfrequented way to Laval (Rte. B). At this point a traveller, endeavouring to make out his way without a guide, may feel some embarrassment, and if he should carry with him the six-sheet Piedmontese map he will almost certainly be led astray. As the Leisse torrent pursues a nearly straight course to Termignon, where it falls into the Arc, the natural direction of the track would apparently be along either bank of the stream. Accordingly, on the Piedmontese map a track along the rt. bank, descending by zigzags to the valley above Termignon, is conspicuously laid down. In point of fact, the Leisse below Entre-deux-Eaux soon enters a narrow defile below high and steep walls of rock. The editor has not been able to ascertain whether it is possible to pass along the rt. bank, but if there be a way, it is certainly very difficult and circuitous, and is never used by the natives. Parallel to the Leisse, but separated from it by a rocky ridge, is a trough-like depression, less elevated than the Col de la Vanoise, but nearly as long, and it is over this pass that the track leading to the valley of the Arc has been carried. An ascent of about 20 min. leads from the bridge over the Larossor to the plateau called *Plan du Loup*, probably a corruption for Plan des Laux, as it contains several

small lakes or tarns. To the l. on a rock is the oratory of St. Bartholomé, beyond which the plateau continues, at first nearly level, and then descending slightly, till at its S. end a steep descent over the bare side of the mountain leads to the village of *Chavière*, where commences a char-road leading to Termignon. There is a foot-path which winds round the steep slope of the mountain SE. from Chavière, and descends direct to Lanslebourg; but, though shorter in distance, it is said to be no saving of time.

The scenery during the descent from Chavière to Termignon is so singular and striking that travellers should arrange their plans in order to make this part of the route by daylight. Immediately below the village the gorge of Combarenel descends very steeply. Down this gorge the char-road is carried in long zigzags through a forest of fir and pine, dimly lighted even at mid-day amid the rocks which enclose it. A peculiarity of the rock in this neighbourhood is to form vertical columns or obelisks, which stand out abruptly from the slope of the mountain. Several of these are seen near Chavière, but the most remarkable—called *Rocs du Pelvaux*—are close to the road in the descent through the pine forest. Throughout the descent the rocks which rise on either side of the gorge present bold and fantastic forms, and a fine background gradually opens as the road approaches the valley of the Leisse. After passing the hamlet of Villard, and descending a final stony slope, the track returns to the valley of the Leisse, or Doron d'Entre-deux-Eaux, when the impassable gorge through which that stream descends from Entre-deux-Eaux comes well into view. On the opposite side of the valley another torrent, called Grand Puy, issuing from a ravine no less inaccessible, the Combe d'Enfer, forms a remarkable series of cascades. $\frac{1}{2}$ hr.'s walk along the nearly level valley leads to *Termignon* (§ 7, Rte. A), 1 hr. below Lanslebourg. A pedestrian, by mounting a little to the l.,

may join the high-road some distance above the village, and so save 10 min.

ROUTE F.

PRALOGNAN TO MODANE, BY THE COL DE CHAVIÈRE, OR THE COL D'AUSSOIS.

7 hrs. by the Col de Chavière. $8\frac{1}{2}$ hrs. by the Col d'Aussois.

The Doron, which has been mentioned in several preceding routes as the chief affluent of the Isère, descends due N. from the Col de Chavière, immediately above Modane, and, bending slightly to the E., receives the Glière at Pralognan. The direct route from the latter village to Modane is by the Col de Chavière, but the Col d'Aussois, leading to the village of the same name, serves as an alternative route, and is the shortest way to La Verney on the high-road of the Mont Cenis (§ 7, Rte. A). The distances have been somewhat underrated in Joanne's 'Itinéraire,' and it would be a very long day's walk to make either pass from Moutiers, or even from Brides. A traveller bound to or from either of those places may save nearly a mile by avoiding Pralognan, and keeping to the path which mounts the valley of the Doron along the l. bank. Opposite to the village of Pralognan a bridge leads to that path, which here commands a fine view of the Grande Casse (Rte. E), and mounts over Alpine pastures, passing in the way several groups of châteaux. At the first of these, called *Les Dies*, a path mounting to the rt. traverses the ridge which separates the Doron from the Val de la Rivière, by which it would be possible to return to Bozel. After crossing the Doron, and returning to the l. bank, the path reaches the châteaux of La Motte, which stand below a glacier descending from the Roche Chevière. $\frac{1}{2}$ hr. farther, 3 hrs. from Pralognan, is the châteaux of *Ritort*, where the path leading to the Col d'Aussois turns to the l. About $\frac{3}{4}$ m. farther in the ascent to the Col de Chavière a path

bending sharply to the rt. or NW. leads to the *Col de Corneilla*. About $1\frac{1}{2}$ m. farther is the solitary chalet of Chavière. Here another track diverges to the rt., and after passing near the Lac Blanc leads to the *Pas de Souffre*. This, as well as the Col de Corneilla, connects the Col de Chavière with Brides les Bains by the Combe des Allues. The summit of the *Col de Chavière*, $4\frac{1}{2}$ hrs. from Pralognan, and 9,144 ft. in height, according to Mr. Mathews, lies WNW. of the *Pointe de Massa*. From the Col, and from several points in the ascent, there is a very fine view of the chain of Mont Blanc. A more extensive view, perhaps one of the finest in this part of the Alps, is obtained from a rocky peak some distance W. of the Col, which was climbed in 1861 by Mr. Mathews. The summit, which was reached in $2\frac{1}{2}$ hrs., after crossing an extensive glacier plateau, seems to remain unnamed and neglected, though 11,467 ft. in height, and commanding an extremely fine view of the Dauphiné Alps. Mr. Mathews describes it as 'one of the teeth of a knotted system of serrated ridges, sending out a number of spurs to the northward, and overtopped by several of the serratures of the ridge next to us on the W.' The descent was effected directly from the summit to the chalets of Poleset in $2\frac{1}{2}$ hrs.

From the Col the path to Modane passes at first down some rocky slopes, and then, becoming gradually steeper, descends on the E. side of a nearly vertical cliff, seamed with waterfalls from a glacier overhead. The rocky gorge below leads, amid very fine scenery, to the chalets of *Poleset* (6,014'), $1\frac{1}{2}$ hr. below the Col descending, but $2\frac{1}{2}$ hrs. are required for the ascent. These chalets are rather superior to the average, and afford tolerable night-quarters. The glen, or ravine, of Poleset is interesting to the geologist, as it lies along the line of junction between the carboniferous rocks to the W. and newer secondary strata to the E. From the chalets the path to Modane at first turns E. over

pastures, and then descends to the S. by a path which zigzags through a fine pine forest, reaching the town in 1 hr. Nearly $1\frac{1}{2}$ hr. should be allowed for the ascent.

As mentioned above, the path to the *Col d'Aussois*, written also Col de Rosuire, and Col de Rosué, apparently corruptions of the former name, turns to the l. from the path to the Col de Chavière, at the Chalet of Ritort, 3 hrs. above Pralognan. After crossing the Doron, here reduced to a narrow stream, it ascends at first to the E., and then to the S., passing alternately over rocks, debris, and patches of snow. In 2 hrs. from the chalet, the traveller reaches the Col, 9,628 ft. in height, lying immediately W. of the Roche Chevière, which, however, is not accessible from this side. The Col d'Aussois may also be reached from the N. side of the Col de Chavière by the *Col des Echelles*, traversing a ridge which extends to the N. from the Pointe de Nassa. The view is not extensive. A steep descent leads to the highest chalets on the S. side of the pass, called Plan du Fond. These lie S. of the peak of the *Roche Chevière* (10,765'), which may be reached in $2\frac{1}{2}$ hrs., ascending by almost continuous slopes of very steep debris. Farther E., between Plan du Fond and the gorge of the Leisse above Termignon, is the *Dent Parassée* (12,137'), the third in height of the Tarentaise Alps, which has not yet been ascended. From Plan du Fond the descent to the village of *Aussois* lies over successive levels of green pasture, separated by steep steps of pine-covered rock. Le Verney is reached from hence by the new road connecting that place with the Fort of L'Esseillon. The traveller bound for Modane should bear to the rt., descend to the village of *Avrieux*, passing near a very fine waterfall, and keeping to a char-road on the N. side of the Arc may easily reach the town in $3\frac{1}{2}$ hrs. from the Col.

Both these passes are seen to the best advantage when taken from Modane; but as that place is about 1,400 ft. lower than Pralognan, nearly 1 hr.

additional should be allowed for each pass.

ROUTE G.

ST. MICHEL TO MOUTIERS TARENTAISE.

For information as to the passes described in this and the two following rtes., the editor is mainly indebted to Joanne's '*Itinéraire de la Savoie*,' by far the most nearly complete guide to this part of the Alps, yet not free from serious errors in regard to the higher and less easily accessible parts of the chain.

The direct way from St. Michel to Moutiers is by the Col des Encombres. The torrent descending from the Col joins the Arc about 2 m. below St. Michel; but a path mounts directly from the village, winds along the slope of the mountain, and after crossing several ravines, reaches the village of *Baune*, which commands a fine view up the two glens of Valloire and Valmeinier on the opposite side of the Arc. The *Col des Encombres* lies due N. of Baune, and may be reached in about 4 hrs. from St. Michel: its height is probably a little over 8,000 ft. Many impressions of fossil plants are found here, and have given rise to much discussion among geologists as to the age of the rocks in which they are found. W. of the Col is the *Roc des Encombres* (9,252'), surmounted by a stone mound, which was one of the signals used in the measurement of the parallel of latitude. The summit may be reached in 5 hrs. from St. Michel, by ascending directly the steep slope facing the village of Baune. The name Perron des Encombres has been sometimes applied to the Col, and sometimes to the peak; and this circumstance has led M. Joanne into the mistake of attributing to the former the height which belongs to the latter. The most direct way to Moutiers is to descend from the Col into the wild stony *val des Encombres*, which joins the valley of Belleville a short distance

below St. Martin de Belleville. 4 hrs. from the Col are required to reach the junction of the two valleys, and $2\frac{1}{2}$ hrs. from thence to Moutiers; in all $10\frac{1}{2}$ hrs. from St. Michel.

Another way, longer, but more interesting, turns to the rt., about due E. from the Col des Encombres, and passing between the peaks of *Rochenère* and *Château Bourreau*, descends into a circular hollow, lying at the N. side of the latter mountain. Following the torrent, a path leads in 2 hrs. from the Col to the chalets of Bruyères, where another torrent from the SE. (see below) joins the first, and both united form the Nant de Belleville. Following the rt. bank of the stream, the *Vallée de Belleville* gradually opens, and gives signs of the presence of man and of cultivation. Several small hamlets are passed, and in 3 hrs. from Bruyères the path reaches St. Marcel, the first village. The principal village of the entire valley—*St. Martin de Belleville*—is but $\frac{1}{2}$ hr. below St. Marcel, standing on a terrace of the valley, in the midst of walnut and chestnut trees. A char-road now leads down the valley, keeping constantly to the rt. bank of the stream. Opposite the opening of the Val des Encombres, there is a fine view of the snowy summit of the *Roc des Encombres*. *St. Laurent de la Côte*, the next village, $1\frac{1}{2}$ hr. below St. Martin, is opposite the junction of the Nant Brun (Rte. H) with the Nant de Belleville. The valley now opens out as it approaches its union with the Doron and the Isère. The road passes below the village of Villarlurin, crosses the Doron to Salins, and in $2\frac{3}{4}$ hrs. from St. Martin reaches Moutiers (Rte. A), about 12 hrs. from St. Michel by this route.

A third way from St. Michel to Moutiers, rarely used and little known, mounts very steeply from *Orelle*, a village near the high-road, 3 m. E. of St. Michel (§ 7, Rte. A), to a snow-pass, called *Col de la Montée du Fond*, which leads at first over snow-fields, then past the Lac Noir to a torrent that flows NW. to the chalets of Bruyères, at the

head of the valley of Belleville. Opposite to, and due N. of the Col de la Montée du Fond, is the *Col du Paclet*, said to be a very difficult pass, leading to the upper end of the Combe des Allues, which joins the Doron at *Brides les Bains*. It would doubtless be a severe day's work to reach that place from St. Michel by these two passes, but the expedition would probably be very interesting, and deserves the attention of trained mountaineers.

ROUTE H.

ST. JEAN DE MAURIENNE TO MOUTIERS
TARENTEISE, BY THE COL DE LA
PLATIÈRE.

This is a very interesting pass, and when better known will probably be often visited by tourists. In the apparent difficulty of the ascent on the Maurienne side, it may almost be compared to the Gemmi, but it is longer and more laborious than that famous pass. From 9 to 9½ hrs., exclusive of halts, are required to reach Moutiers. 'It is possible to ride as far as the summit of the Col. Charge for a mule from Hermillon to the Col, 3 fr.; for a guide as far as St. Jean de Belleville, from 5 to 6 fr.'—[Joanne.]

Crossing the Arc by the bridge, near the rly. station of St. Jean de Maurienne, a country road leads in 40 min. from the town to the poor village of *Hermillon*. From hence the way turns sharply to the rt., or rather S. of E., and mounts gradually along the base of a range of limestone cliffs, and in 40 min. more reaches the chapel of Notre Dame de Montandrey, a well-known sanctuary, annually resorted to by large numbers of pilgrims on the 8th September. Immediately above the church is a rock which commands a remarkably fine view of the high peaks between the valley of the Arc from that of the Romanche, with the intervening ranges of the valley of Arvan. After passing the mean village of *Montandrey*, the

track turns to the N., and mounts along the upper verge of the same cliffs whose base it had previously encompassed. Hermillon lies at a great depth beneath, and on the W. side of an impassable ravine stand the châteaux of Châtel. After mounting rapidly for ½ hr. the path turns NE., in the direction of the Col, continuing to ascend for another ½ hr., amidst fine old pine trees. On emerging from the forest, the path seems to have entered an impassable *cul de sac*, closed by inaccessible rocks; but a couloir or chimney, through which the track is carried by steep zigzags, affords an issue, and leads to a grass-grown terrace of the mountain, called Planey, from whence the last view is gained of the valley of the Arc, and the town of St. Jean de Maurienne. Above Planey extensive pastures, with several groups of châteaux, stretch towards the Col, and after skirting the margin of a formidably deep ravine which opens on the west, the track reaches those of Plan Monsieur, 2 hrs. 40 min. from Hermillon. In fine weather it is now easy to find the way, as the depression over which lies the pass remains in view, and is marked by a square rock in the midst, called Bonnet du Prêtre. To the rt. the Roc des Encombres is seen above the nearer ridge dividing this plateau from the Val des Encombres. A cross on the ridge marks a passage, called *Col de Valhaussière*, by which it is possible to descend into that wild valley (noticed in last Rte.). 1 hr. 25 min. from Plan Monsieur suffices to reach the *Col de la Platière* (about 6,800'), about 4¾ hrs. from St. Jean de Maurienne. It is possible to pass at either side of the Bonnet du Prêtre, but the track passes to the l. The view is limited, except to the NE., where the range of Mont Blanc, towering over the intermediate ranges, produces a grand effect.

The descent on the N. side of the Col leads into the valley of *Nant Brun*, or Nambrun, a wild and rather dreary glen, bare of trees, surrounded by slopes of débris, with here and there a patch

of snow. The most direct way down lies along a sort of promontory of shattered slate, which projects between two ravines. The point appears very steep, but the nature of the rock facilitates the descent. After 1 hr. the track reaches a point where the torrent of Nant Brun, formed by the union of the streams that drain the head of the valley, has cut a deep ravine through the rock. The track keeps to the l. bank, and after passing the highest châteaux, soon reaches some marshy meadows, the bed of an ancient lake. On reaching the next gorge, which formerly held back the waters of the lake, the path gradually recedes from the torrent, and thenceforward is carried along the W. slope of the valley, at a considerable height above the stream. In about 2 hrs. from the Col, it crosses a considerable affluent, descending from the range to the W., and 20 min. farther reaches the hamlet of *Deux Nants*, near the junction of another stream from the W. with the Nant Brun. The valley here becomes more animated and picturesque. A pine forest clothes the opposite slope of the mountain, and lower down are seen corn-fields, with houses and mills scattered amidst fine walnut trees. After passing several scattered hamlets, the path, in about 3 hrs. from the Col, reaches *St. Jean de Belleville*, a dirty village with a cabaret, picturesquely placed above the junction of the Nant Brun with the valley of Belleville. A bridge over the united streams leads to the road on the rt. bank, near to the village of *St. Laurent de la Côte* (Rte. G); but it is shorter to keep to the rough char-road, carried along the W. slope of the valley, and, after passing under the village of Fontaines, to cross the deep gorge where the Nant de Belleville joins the Doron, opposite to Salins; thence reaching Moutiers in $1\frac{3}{4}$ hr. from *St. Jean de Belleville*, or about $9\frac{1}{2}$ hrs. from *St. Jean de Maurienne*.

ROUTE I.

LA CHAMBRE TO MOUTIERS TARENDAISE OR ALBERTVILLE, BY THE COL DE LA MADELEINE.

This pass is traversed by a well-marked mule-path, much frequented by the country people, being the shortest way from the Maurienne to Tarentaise, but is rarely visited by foreigners. The valley of the Isère may be reached on foot or mule-back in 7 hrs.—thence it is 2 m. to Moutiers or 12 m. to Albertville. A guide is quite unnecessary in fine weather.

From the village of *La Chambre* (§ 7, Rte. A), the mule-path traverses the fields on the l. bank of the *Bugion*, and after crossing a torrent that joins that stream from the W., mounts to the hamlet of *St. Martin*. It then passes to the rt. bank of the *Bugion*, and after skirting the base of some steep rocks, zigzags up a steep ascent to *Montgellafrey*, the highest village on this side of the pass, 1 hr. 40 min. from *La Chambre*. The track then mounts obliquely across the slopes to the NW., having the pass in view for a great part of the way; and in 4 hrs. from *La Chambre* attains the *Col de la Madeleine* (6,637'). From the summit it is apparent that the valley of the *Glandon*, on the opposite side of the *Arc*, and the *Vallon des Celliers*, on the N. side of the *Col*, are the continuation, in opposite directions, of the trough whose central portion is the valley of the *Bugion*.

A stony path leads down from the *Col* to the head of the *Vallon des Celliers*. Here the track divides. If the traveller be bound for Moutiers he should cross the torrent, and for some distance follow the rt. bank; then, turning to the rt. and crossing a low ridge, he will descend by the hamlets of *Doucy* and *St. Oyen* to the village of *Belleville* (3 hrs. from the *Col*), close to the junction of the *Moret* torrent with the *Isère*. Thence after crossing, first the *Moret* and then the

Isère, he will fall into the high-road to Moutiers (Rte. A) at the village of Aigueblanche. [The Moret torrent drains the *Combe des Avanchers* which opens to the S. from Bellecombe. From the village of Avanchers paths lead to Villardy and to Fontaine, in the valley of Belleville (Rte. H).]

Should the traveller's destination be Cevins or Albertville, he must keep to the l. bank of the stream throughout the Vallon des Celliers. After passing the village of *Celliers*, and the hamlets of Thuile and Villard Benoît, he will in $2\frac{3}{4}$ hrs. reach *Bonneval*, near the chapel of Notre Dame de Briançon, at the E. end of the defile of Briançon, about 3 m. from La Roche Cevins (Rte. A).

SECTION 12.

ALBERTVILLE DISTRICT—VALLEY OF THE ARLY.

It has been seen in § 10 that Chambéry stands in a valley between two systems of parallel ridges of limestone, both connected with the ranges that enclose the Grande Chartreuse. The western system is directed first to the N. and then NW., forming the Jura range. The eastern system forms near to Chambéry the range of the Beauges, and a glance at the geological maps accompanying this volume will show that this is the SW. extremity of a zone of secondary rocks traversing Savoy and Switzerland from WSW. to NNE., and associated with eocene deposits which lie along its geometrical axis, between an outer fringe of cretaceous and jurassic rocks. The geological disposition of the strata here corresponds in a general way with the orographic relations. The prevailing tendency of the ridges and the main valleys is parallel to the general strike of the strata, but the whole mass is at intervals cut through nearly at right angles by deep valleys, often narrowed to mere defiles. Of this character is the defile of Magland,

between Cluses and Sallanches in the valley of the Arve, which forms a natural division between the limestone mountains of Chablais and Faucigny and those which extend from the Arve to the Lake of Annecy. These are separated by the valley of the Arly from a group of higher mountains, chiefly composed of crystalline and metamorphic rocks, which form a link in the chain connecting Mont Blanc with the Belledonne and the Taillefer on the opposite sides of the valley of the Romanche. This group might have been considered as a SW. prolongation of the range of Mont Blanc; but if, following the example of most geographers, we consider the latter to be limited by the Val de Montjoie and the Col du Bonhomme, it appears most convenient to unite it in the present section with the adjoining limestone ranges W. of the Arly, and to name the district from Albertville, the only place of any importance with which it is connected.

Though little known to English tourists, this district abounds in agreeable scenery, and is full of interest to the naturalist and the geologist. The most central point in the limestone mountain district is Thones, whence the ascent of the Tournette, the Mont Charvin, and other interesting excursions, may be made. The country surrounding St. Maxime de Beaufort is not less interesting, and presents a striking contrast in the character of its scenery, owing to the different nature of the rocks which there prevail.

ROUTE A.

ALBERTVILLE TO SALLANCHES — MONT JOLI.

	Hrs.' walking	Eng. miles
Ugine . . .	$1\frac{1}{2}$	5
Flumet . . .	$3\frac{3}{4}$	$10\frac{1}{2}$
Megève . . .	2	6
Sallanches . . .	2	6
	9	$27\frac{1}{2}$

There is a good road from Albertville (§ 11, Rte. A) to Ugine; between that

place and Sallanches a char-road has been in progress for some years, but according to the latest information received it is open only between Flumet and Sallanches, leaving the space between Ugine and Flumet to be traversed on foot or mule-back. The Annecy diligence may be used as far as Ugine.

The road keeps to the rt. bank of the *Arly*, passing opposite to the opening of the valley of Beaufort (Rte. E), amidst very pleasing scenery, enlivened by numerous villages that lie on the E. slopes of the *Mont l'Étoile*. About $4\frac{1}{2}$ m. from Albertville the road to Faverges and Annecy turns off to the l. before mounting the hill, whereon stands

Ugine (Inn: La Grande Maison), a large straggling town (1,755'), overlooked by the remains of a very ancient castle perched upon a steep rock. Due N. of Ugine is the *Mont Charvin* (7,920'), the highest summit of the ranges lying W. of the Arly and the Isère. It was one of the stations used in the triangulation of France, and must command an admirable panorama, but it does not appear to have attracted the attention of Alpine travellers. Above Ugine the mule-path mounts rather steeply the E. slope of one of the buttresses of the *Mont Charvin* at a great height above the Arly, and in 2 hrs. (ascending) reaches the village of *Héry* (Inn: L'Entrée des Voyageurs), 3,045 ft. in height, beautifully situated amidst bold rocks and pine forest. Above Héry the ascent is less steep; a little col is soon passed; the path descends to cross the *Flons*, a torrent from the Charvin, and then keeps nearly at a level, passing above the village of St. Nicholas de la Chapelle, till, after traversing the considerable stream of *Norandine*, along which is a path to St. Jean de Sixt (Rte. C), in 2 hrs. from Héry it reaches

Flumet (3,018'), a little town with an inn, and the remains of the castle of the first baron of Faucigny. Several paths lead to the valleys of Beaufort and Hauteluce (Rte. E). From hence the char-road is open to Sallanches.

For about 6 m. it follows the rt. bank of the Arly to *Megève* (3,700'), where there is a country inn (Soleil d'Or), convenient for those who make the ascent of the *Mont Joli*. This excursion may be made from Sallanches, St. Gervais, or Contamines; but it is a better arrangement to ascend from Megève and descend to St. Gervais, thus saving labour, reaching the summit at an earlier hour, and securing the most advantageous points of view. Megève being 1,634 ft. above St. Gervais, and more than 1,800 ft. above Sallanches, fully an hour is saved in the ascent, which may be made in $3\frac{1}{2}$ hrs., and the way is so easy that a mule may be taken nearly to the top. The *Mont Joli* (8,760') stands in a similar relation to the W. end of *Mont Blanc* that the *Brévent* and the *Cramont* hold respectively to the N. and S. faces of the great mountain, being separated from it merely by the valley of *Montjoie*. Besides the grand view of *Mont Blanc*, the range of the *Buet* and the mountains of *Sixt* (§ 17) are well seen from here, and one of the peaks of the *Bernese Alps* (*Wildstrubel*?) appears over the *Col de Balme*. In the opposite direction the eye ranges along the valley of the *Isère* to the heights above *Grenoble*.

The road from Megève to Sallanches soon crosses the low watershed which separates the Arly from a stream falling to the N., to join the *Arve* near Sallanches. During the descent the chain of *Mont Blanc* comes gradually into sight, and at *Combloux*, 1 hr. from Megève, the view almost rivals that from the *Mont Joli*. St. Gervais is easily reached in 1 hr. by *Domancy*. The same time, or even less, suffices to descend to Sallanches (§ 16), and the entire way lies amid grand views of the neighbouring Alps.

ROUTE B.

ALBERTVILLE TO ANNECY.

A diligence runs daily between Al-

bertville and Annecy, a distance of about 28 m., passing close to Ugine (Rte. A), and thence to Faverges, 12½ m. from the former town; but a pedestrian may take a much more interesting way, which will lead him in 4 hrs.' steady walking to Faverges. The path turns off from the high-road to Chambéry (§ 11, Rte. A), near the village of *Tournon*, about 3 m. from Albertville, and mounts directly by steep rocks to the *Col de Tamié* (4,354'), commanding a fine view of the valley of the Isère. This low pass separates the mountains at the head of the Combe de Bellavaux (§ 10) from the *Mont l'Étoile*, which may be considered as the connecting link between the Beauges and the range of the Mont Charvin, being separated from the latter by the valley of the *Chaise*, through which the post road runs from Ugine to Faverges. At a short distance below the Col on the N. side are the ruins of the *Abbey of Tamié*, founded in 1132. The descent to Faverges lies through very picturesque scenery. The post road from Albertville, as mentioned in last Rte., turns off to the l. at the foot of the rising ground on which stands the town of Ugine, and ascends along the l. bank of the *Chaise* to *Marlens*. At that village the valley bends from NW. to SW., and the road keeps to the l. bank until it crosses the stream, in order to traverse the very low pass which separates the *Chaise* from the waters of the *Eau Morte* flowing to the Lake of Annecy.

Faverges (Inn: La Poste, good) is a rather large country town, with iron works and mills for spinning silk. The summit of Mont Blanc is seen from the town, and the surrounding hills all command fine views; but the excursion especially recommended to the mountaineer is the ascent of the *Tournette* (7,756'), a long ridge of limestone, whose S. end rises from the little plain of Faverges, and whose steep western slopes face the Lake of Annecy. The ascent may be made from Faverges or from Thones (Rte. C), or by a steeper and more

laborious path from Talloires, on the Lake of Annecy. The best plan is to mount from either of the first-named places and descend to Talloires; in each case the ascent requires at least 6 hrs., and the descent about 4 hrs.; so that, allowing for halts, it is a tolerably long day's work. It is not prudent to start without a guide, as the time lost in seeking the way may compromise the result of the excursion. The crest of the mountain (about 7,500') is a ridge which spreads out into a platform, surmounted by a sort of tower of rock, with walls not merely vertical, but in some places actually overhanging their base. The summit of this rock, called the *Fauteuil*, is reached by a fissure or chimney, which should not be attempted by persons liable to giddiness. The view combines the Lake of Annecy and a portion of the Lake of Geneva, with a grand Alpine panorama. It is probable, however, that the nearer view of the Savoy Alps and Mont Blanc from the Mont Charvin is in some respects superior.

From Faverges to Annecy the traveller has the choice between two roads. The diligence travels by the W. shore of the lake, which is reached by following the *Eau Morte*, and leaving on the rt. hand the marshy plain at the head of the lake formed from the detritus of that stream. Passing close to *Doussard*, whence a path leads to the Col de Chérel (§ 10), the road reaches the lake about 5 m. from Faverges. 3 m. farther is the castle and village of *Duingt*, where citizens of Chambéry and Annecy in search of cool air and fine scenery find lodgings in the summer. The castle stands on a promontory, which narrows the lake to half its width. The charge for a boat from Annecy to Duingt is 4 fr., and for the same, or a less price, a boat may usually be found by a traveller going to Annecy. [For the foot-path by Entrevernes, and the road from St. Jorio, 2½ m. beyond Duingt, both leading to Châtelard, see § 10.] The distance by the post-road is about 8 m., passing *St. Jorio* and *Servier*, to

Annecy (Inns: H. de l'Angleterre, near the diligence office; H. de Genève, near the lake; both good; H. de l'Europe), an important town, capital of the Department of Haute Savoie, and possessing many thriving factories, partly worked by the water of the lake, which is conveyed through the town to the river Fier in artificial channels of great antiquity. The cathedral, the church of St. Dominic, and that of the Convent of the Visitation, containing the remains of St. François de Sales, are worth a visit. The neighbourhood of Annecy is intimately connected with the labours of that zealous and enlightened bishop, and with the early life of Jean-Jacques Rousseau. The lake is about 1,450 ft. above the sea, 9 m. long, and from 1 to 2 in breadth. On rising ground N. of the town is *Annecy le Vieux*, whose Roman origin is attested by many medals, urns, and fragments of statuary. Many agreeable walks and drives are to be found in the neighbourhood of the town and on the slopes of the neighbouring hills.

Diligences run daily from Annecy to Aix, 20 m., by Alby and Albens; to Geneva, 26 m., by Cruseilles, passing the remarkable wire suspension bridge of *La Caille*, 212 yds. in length, and 650 ft. above the torrent of Les Usses; to Rumilly by a hilly road, 11½ m., whence a rough country road leads in about 10 min. to the Seyssel station on the rly. from Lyons to Geneva; and, lastly, to Bonneville (see next Rte.).

The road from Faverges to Annecy by the E. shore of the lake is more hilly, and perhaps more interesting than that by Duingt. Opposite to the village of Doussard a bridge crosses to the rt. bank of the Eau Morte, near Verthier, and, skirting the S. end of the lake in 5 m. from the bridge, reaches *Talloires*, a village beautifully situated opposite the castle of Duingt. The luxuriance of the vegetation and the mildness of the climate of this part of the lake have been extolled by Eugène Sue, who spent the latter years of his life as an exile from France in the neighbourhood of

Annecy. There is a path from hence to Thonnes by the *Col de Nantes*, and the summit of the Tournette (see above) may be reached by St. Germain, the châlet of Lô, and that of Cassay (5,873'). Less than 2 m. beyond Talloires is *Menthon*, with remains of Roman baths, and of piles of Roman masonry projecting into the lake, supposed to have been the commencement of a bridge designed to unite the opposite shores (?). The castle, still in partial preservation, contains a room which is pointed out as the birth-place of St. Bernard of Menthon, the founder of the Hospice of the Great St. Bernard, of whose life an interesting sketch is given in King's 'Italian Valleys of the Pennine Alps.' The scenery of the road between Menthon and Annecy (5½ m.) is varied and interesting.

ROUTE C.

ANNECY TO BONNEVILLE.

The post road from Annecy to Bonneville runs at first nearly due N. along the rt. bank of the *Fillière*, an affluent of the Fier, and leaving on the rt. hand the picturesque valley of *Thorens*, through which the *Fillière* descends from the E., follows a stream from the NE., leading to a low col (2,605'), which it passes, to the village of *La Roche*, overlooking the valley of the Arve. A road descending to the N. leads to Geneva, and another due E. reaches Bonneville (§ 16, Rte. A) in 21¼ m. from Annecy.

Another longer but more interesting road, passable for chars, after a slight detour by Annecy le Vieux to avoid the intervening range of hills, mounts through the valley of the *Fier* in a direction somewhat S. of E. to the bridge of *St. Clair* (5 m. from Annecy), leading to the curious remains of a Roman road, partly excavated through the limestone rock. [Here the *Vallon de Dingy* opens to the N., and leads directly to the summit of the *Parmelan* (6,007'), a rugged limestone ridge, which, like all

the neighbouring mountains, commands a very fine view. The ascent is less laborious than that of the Tournette, but is also less interesting.] From St. Clair a road runs along either bank of the Fier, in $6\frac{1}{2}$ m., to

Thones, a large village, with an inn, in a picturesque situation at the meeting of several mountain glens. One of these leads SSW. by the *Col de Nantes* W. of the Tournette, to Talloires (Rte. B). A second glen leads, about due S., by *Les Clefs* and a low pass between the range of the Tournette and that of the Mont Charvin to *Serraval*, the best starting-point for the ascent of the latter mountain. From thence one path leads direct to Faverges, and another, crossing a spur of the Charvin, descends to Marlens (Rte. B). Either place may be reached in 5 hrs. from Thones. A third glen, *La Combe de Manigod*, descending from the E. to Les Clefs, above Thones, bears down the head waters of the Fier, which rises on the N. side of the Mont Charvin. The fourth of the glens which meet at Thones is that of the *Nom* torrent, through which lies the way to Bonneville. At La Cour, about $1\frac{1}{2}$ m. above Thones, the road crosses from the l. to the rt. bank, and continues in a direct course to the NE., till in about $5\frac{1}{2}$ m. (or 17 m. from Annecy) it gains the summit of a low pass, *Col de St. Jean de Sixt*, which separates the Nom from the valley of the Borne. [In mounting to the Col the road passes about $\frac{1}{2}$ m. to the W. of the village of *St. Jean de Sixt*, whence a path leads SE. by La Clusaz to the *Col des Aravis* (4,928'), and descends by La Giettaz to Flumet (Rte. A).

In less than a mile from the Col de St. Jean de Sixt, the road reaches the *Borne* (for the way to Sallanches and Cluses, see next Rte.), crosses a bridge to the rt. bank, and descends through a defile where there is a fine waterfall to *Entremont* (Inn: *Epée Couronnée*), 3 m. from the Col. [Entremont may be reached from *Thuy*, in the valley of the Fier, $1\frac{1}{2}$ m. below Thones, by a path parallel to the course of the Nom, cross-

ing the *Col de la Buffa*. This way is rather shorter, but much rougher and steeper than the char-road.]

4 m. below Entremont is *Cret*, the chief village of the valley of the Borne. The road keeps along the rt. bank, passing several hamlets, and rises to a great height above the torrent, till about 4 m. from Cret it gains a point overlooking the junction of Borne with the Arve, and commanding a fine view of the broad valley, in the midst of which lies Bonneville, about 6 m. from Cret, or 30 m. from Annecy by this rte.

ROUTE D.

ANNECY TO SALLANCHES OR CLUSES.

From 12 to 13 hrs.' walk to either place.

To reach Sallanches or Cluses from Annecy involves rather more than a fair day's walk; but by starting very early in a char, which may be taken as far as Thones, and breakfasting there at the village inn, the expedition is brought within moderate limits. The least laborious way from Thones to Sallanches, though it involves a considerable circuit, is to pass by the village of St. Jean de Sixt and the Col des Aravis (noticed in last Rte.) to Flumet, and there hire a char to Sallanches (see Rte. A). The direct way is to cross the Col de St. Jean de Sixt, $5\frac{1}{4}$ hrs. from Annecy, and on descending to the bridge over the Borne, mentioned in last Rte., to turn to the rt., ascending the course of that stream, here flowing from the NE., to Villeneuve (Inn: *A la Victoire*), $\frac{3}{4}$ hr. from the Col, the chief hamlet of the commune of *Grand Bornand*, 4,227 ft. above the sea. Here the char-road ends, and the valley of the Borne divides; the eastern branch passes to the S. of the *Mont Fleury*, and a path leads to Sallanches over the *Col des Fours*. [Further information is desired.]

The way to Cluses lies through the glen which descends from the N. to join the Borne at Villeneuve. Two torrents meet at the head of the glen above

the hamlet of *Chinaillon*, and each of them leads to a pass. The most direct way is by the l. hand path, mounting at first to NE., and then nearly due E., to the pass called *Haut du Col*, lying immediately under the pyramidal summit of the *Jallouvre*. A steep descent through woods and meadows leads to *Pralong* (3,199'), 4 hrs. from Villeneuve, whence Cluses is reached in $2\frac{1}{4}$ hrs. by a path along the l. bank of the torrent which joins the high-road from Geneva at Scionzier (§ 16, Rte. A.).

The path following the rt. hand torrent above *Chinaillon* is less steep and more interesting, but $\frac{1}{2}$ hr. longer than that by the *Haut du Col*. It mounts due E. to a col on the N. side of the *Mont Fleury*, and then descends to *Somier* at the head of the *Vallée du Reposoir*. [From *Somier* a path mounts to the E., crosses the ridge of the *Mont Meiry* by a pass nearly 6,000 ft. in height, and descends to *Sallanches*.] About 2 m. below *Somier* is the *Chartreuse du Reposoir* (3,405'), founded in 1151. The building is interesting in itself, and rendered doubly so by the fine scenery which surrounds it. The valley is enclosed between the range of the *Mont Vergy* to the W. and the *Mont Meiry* to the E. The highest point of the latter ridge is the *Pointe Percée*, a shattered wall of limestone rock, utterly inaccessible, and pierced through by an opening, which may be seen from the *Chartreuse*. The valley and the mountains around it are peculiarly rich in rare plants, including most of the species peculiar to the calcareous rocks of this part of the Alpine chain. About 1 m. below the *Chartreuse* the path reaches *Pralong*, and joins that above described by the *Haut du Col*.

ROUTE E.

ALBERTVILLE TO ST. GERVAIS, BY THE VALLEY OF BEAUFORT.

$14\frac{1}{2}$ hrs. by Haute Luce.

A short distance N. of Albertville the Arly receives from the E. a powerful

torrent, which, to distinguish it from other streams of the same name, is called the *Doron de Beaufort*. This drains the entire mountain district of *Beaufort*, lying between Albertville and the chain of *Mont Blanc*. This district contains some fine scenery, and many rare plants. It may very conveniently be visited in the way to *Mont Blanc*, as a traveller leaving Paris by the night train may easily reach St. Maxime de Beaufort on the following evening in 7 or $7\frac{1}{2}$ hrs. from the rly. station at *Chamousset*. (See § 11, Rte. A.)

After crossing the bridge over the Arly at Albertville, a char-road leads to *Venthon*, near the junction of the *Doron* with the Arly. For about 3 m. the track leading up the valley keeps to the l. bank, till opposite the village of *Queige*, which stands on the N. side of the stream. Here the valley of *Beaufort* opens out to the E., between the *Mont Mirantin* to the S., and the *Bisanne* to the N. After passing *Villards* (2,375'), and the ancient castle of *Beaufort*, standing on a conical hill which overlooks the entire valley, in $4\frac{1}{2}$ hrs. from Albertville the traveller reaches *St. Maxime de Beaufort*, a large village with a very fair inn, chez *Henri Martin*, finely situated at the meeting of three valleys. From the NE. the *Dorinet* torrent, flowing through the valley of *Haute Luce*, joins the *Doron* a short distance below the village, while exactly opposite the valley of *Pontcellamot* opens to the S. To the E. is the main valley, which above St. Maxime is called the valley of the *Gitta*. The way to St. Gervais is by the first of these valleys. A steep ascent, by a track which turns round the angle of the mountain, leads to the hamlet of *Les Traverses*, and after crossing to the rt. bank of the *Dorinet*, in $1\frac{1}{2}$ hr. the traveller reaches *Haute Luce*, whence a track leads across the mountain to the NW. to *Notre Dame de Bellecombe* and *Flumet* (Rte. A.). Keeping to the rt. bank, in $\frac{1}{2}$ hr. beyond *Haute Luce* the path passes *Annuit* (whence *Megève* [Rte. A.] may be reached by the *Col de Véry*), and

after a long ascent attains the châteaux of Planey, $2\frac{1}{2}$ hrs. (?) from Haute Luce. Here a track turning S. leads to the *Lac de la Girottaz*, lying in a hollow on the N. side of the *Rocher des Enclaves*. The upper end of the valley, and especially the neighbourhood of the lake, are rich in rare plants. Among others may be mentioned *Gentiana Burseri*, *G. purpurea*, *G. punctata*, and *G. angustifolia*, *Epipogium Gmelini*, *Listera cordata*, and *Corallorhiza innata*. Another track bears to the E., and after passing the châteaux of Colombe, crosses a pass called *Enclave de la Fenêtre*, leading to the Val de Montjoie, above Nant Borrant (§ 16). The way to St. Gervais keeps to N.E., and in $1\frac{1}{2}$ hr. from Planey attains the *Col Joli*, whence Contamines may be reached in $2\frac{1}{4}$ hrs.— $7\frac{3}{4}$ hrs. from St. Maxime. $2\frac{1}{4}$ hrs. more conduct the traveller to the Baths of St. Gervais (§ 16).

ROUTE F.

ALBERTVILLE TO BOURG ST. MAURICE, BY BEAUFORT.

From St. Maxime de Beaufort, $4\frac{1}{2}$ hrs. from Albertville (Rte. E), the path through the upper valley of the Doron, or *Vallée de la Gitta*, at first enters a narrow gorge between steep rocks, before long passes to the l. bank of the stream, and in $1\frac{1}{2}$ hr., or less, reaches the opening of the *Val de Treicol*, a glen which mounts towards the S. on the W. side of the *Aiguille du Grand Fond*. Here there is a choice between two paths, both of them rather laborious, and not easily found without a guide.

1. *By the Col de la Saulce*. The path follows the main valley due E., from the junction to the hamlet of *Gitta* (5,512'). $3\frac{1}{2}$ hrs. from St. Maxime, lying at the S. base of the *Pointe du Four*. The scenery of the upper end of the valley is extremely fine, and many scarce plants will reward the botanist. Near the highest châteaux *Phaca frigida* has been found, with *Potentilla minima*,

Gentiana brachyphylla and other rarities. An ascent of $1\frac{1}{2}$ hr. leads from Gitta to the *Col de la Saulce*, 5 hrs. from St. Maxime, lying between the *Tête du Bonhomme* on the rt. and the *Rousselette* on the l. The traveller has now reached the point of junction between the head of the valley of Beaufort and that of Montjoie; and though 1 hr. distant, not much below the level of the *Col du Bonhomme*, by which both of them communicate with the gorge of Bellaval.

[Bearing to the l., the traveller may soon join the mule-path from the *Col du Bonhomme* to St. Gervais, and reach that place in $6\frac{1}{2}$ hrs.] To reach Bourg St. Maurice from the *Col de la Saulce*, it is necessary to follow the track to the *Col du Bonhomme*, and descend in $1\frac{3}{4}$ hr. to Chapiu (§ 16, Rte. B). The great majority of travellers who pass Chapiu remount to the N.E., through the glen leading by Motet and the *Col de la Seigne* to Courmayeur. Comparatively few descend through the wild and somewhat dreary *Val de Bellaval* to the valley of the Isère. After crossing a torrent from the *Aiguille du Grand Fond*, the latter way follows the rt. bank of the torrent until, nearly 1 hr. below Chapiu, it crosses to the châteaux of Gray Betel on the opposite bank. About $2\frac{1}{4}$ hrs. are required to reach *Bonneval*, at the junction of the *Versoie* from the N.E. with the *Val de Bellaval*. A brighter vegetation offers an agreeable change from the stern barrenness through which the track has lain for several hours. The path returns to the rt. bank of the stream, now called *Versoie*, and, keeping at a considerable height above it, descends to the road leading from Scez to Bourg St. Maurice, at a short distance from that town (§ 11, Rte. A), which is rather less than 1 hr. from *Bonneval*, and nearly 11 hrs. from St. Maxime de Beaufort by this route.

2. *By the Col de l'Allée*. This way is shorter, and quite equal in point of scenery to that by the *Col du Bonhomme*. The path mounts along the l. bank of the torrent for about an hour

above the opening of the Val de Treicol, when a lateral valley is seen on the opposite bank, through which flows a stream that drains the N. side of the Aiguille du Grand Fond. The path ascends this lateral valley, at first on the l. bank, and then crosses to the opposite side to reach the hamlet of *Roselein*, rather more than 3 hrs. from St. Maxime. About $3\frac{1}{2}$ hrs. are required to reach the *Col de l'Allée* (probably should be *Col de la Lex*), 6,454 ft. in height, and to descend thence by a very steep path, which reaches the Val de Bellaval just below Chapin. Rather more than 3 hrs. more, or about 10 hrs. from St. Maxime, suffice to reach Bourg St. Maurice.

There is a pass from the head of the Val de Treicol which joins the path of the Col de Cormet (see next Rte.) on the S. side of the latter pass. Instead of descending to Aime, it is possible to follow a path to the l., leading to Bel-lentre (§ 11, Rte. A), and it is probable that in this way Bourg St. Maurice may be reached in rather less time than by either of the routes above described. Further information is desired.

ROUTE G.

ST. MAXIME DE BEAUFORT TO MOUTIERS TARENTEISE.

Moutiers being placed at the extremity of a ridge which projects to the S. from the main mass of the mountains of Beaufort, it is reached by passes which join the valley of the Isère some miles to the NW. or NE. of the town. The way from St. Maxime lies due S. through the valley of *Pontcellamot*, by a mule-path which mounts rather rapidly along the rt. bank of the stream. Oppo-

site the hamlet of *Arèche*, where there is a cabaret, a branch of the valley mounts SW. to the *Col de la Bâthie*, from whence La Bâthie or La Roche Cevins, on the high-road from Albertville to Moutiers, may be reached in about $5\frac{1}{2}$ hrs. from St. Maxime.

The lover of Alpinescenery will prefer to follow the main branch of the Vallée de Pontcellamot, along the path which keeps to the rt. bank, and after passing through a considerable pine forest, reaches the chapel of Guérin, $3\frac{1}{4}$ hrs. from St. Maxime. Here the mule-path divides, and the traveller has the choice between two routes, of which the most interesting, especially to the botanist, is that to the rt., mounting by the châteaux of Grande Combe to the *Col de la Louze*. The track descends to a châlet, called La Grande Maison, and after following the torrent for some distance, crosses the ridge which separates this from another parallel stream to the E., passes the village of *Naves*, and reaches the valley of the Isère at Petit Cœur, about 5 m. NW. of Moutiers. By the torrent descending from the Col, the botanist may find *Eryngium alpinum*, *Rhapiticum scariosum*, and *Sonchus Plumieri* and on the Col *Luzula pediformis*.

The l. hand path leads in 2 hrs. from Guérin to the *Col du Cormet*, lying on the N. side of a summit called *Cret du Ré*. After descending to some châteaux, the path follows the torrent, and then passes through a pine forest before reaching Granier, a village 2 hrs. from the Col, overlooking the valley of the Isère. The descent to Aime is made in $\frac{1}{2}$ hr., and 3 hrs. more along the high-road suffice to reach Moutiers (§ 11, Rte. A), which by this route is $10\frac{3}{4}$ hrs. from St. Maxime, and about $\frac{1}{2}$ hr. less by the Col de la Louze.

CHAPTER V.

GRAIAN ALPS.

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As stated in the introduction to the last chapter, we propose to confine the designation Graian Alps to the portion of the main chain lying between the Roche Melon and Mont Blanc, with the great mass extending from it to the east between the Val d'Aosta, or valley of the Dora Baltea, and the valley of the Dora Riparia from Susa to Turin. These two valleys form a perfectly natural boundary to the N. and S. The plain of Piedmont, into which the Graian Alps gradually subside, mark their eastern limit, while

to the W. they are separated from the Tarentaise Alps (§ 11) by the upper valley of the Isère and the Col d'Iséran. To fix the exact links in the main chain which should form the boundaries between its different members is always a somewhat arbitrary process: in the present case it seems most convenient to select the pass of the Little St. Bernard to the N., and that of the Col de l'Autaret to the S., as the limits between the Graian and the Pennine chain on one side, and the Cottians on the other.

The characteristic feature in the orography of this group is the huge triangular mass of rock and glacier which stands about its centre, between the valleys of Cogne, Savaranche, and Locana. This contains the two highest peaks—Grand Paradis (13,300') and the Grivola (13,028'), and is cut off from the main chain by the comparatively low pass of La Croix de Nivolet (8,624'). S. of this central mass the principal valleys, containing torrents that spring from the main chain, are all directed from W. to E. On the W. side of the same central mass the valleys of Rhêmes and Grisanche run parallel to the Val Savaranche from SSW. to NNE., while on the E. side the Val de Cogne descends from SE. to NW.

It might have been hoped that this group, containing the highest peaks of the Alps that lie altogether in Italy, would have attracted the attention of Italian geographers and men of science. This has not been the case; and the great map of Piedmont issued by the War Department in Turin gives but too evident proof that the officers engaged upon it have not only omitted to make a survey, but have not even penetrated into many of the upper valleys which they have depicted. Of the seven highest summits now known and measured, but one—La Levanna—is laid down on the six-sheet map, and the position of many of the ridges and glaciers there represented is absolutely different from the reality. It is mainly through the energy and determination of members of the Alpine Club, and especially Messrs. Cowell, Tuckett, and W. Mathews, that the greater part of the Graian Alps is now tolerably well known, that the highest peaks have all yielded to the foot of man, and have been measured with more or less accuracy, and that several new glacier passes have been explored. The result has been to enlarge the bounds within which the Alpine traveller may gratify his love for scenery of the grandest character, without entirely removing

the attraction which the unknown usually exerts upon him; for several fine peaks, such as the Grand Appareil and the Tour de St. Pierre, remain still unascended, and there is much room for new exploration among the peaks and glaciers that lie between the Levanna and the Roche Melon.

The Graian Alps are naturally divided into three districts by the valleys of Savaranche and Locana, which meet at the pass of La Croix de Nivolet, and are connected with the head of the valley of the Isère by the Col de Galèse. S. of the Val Locana is the district which we shall designate by the name of its best known, and probably its highest summit—the Levanna. N. of the same valley, and E. of the Val Savaranche, is the central group, forming, with its outliers, the Paradis district, while the ridges and valleys W. of Val Savaranche may most conveniently be called the Ruitor district, from the massive glacier-clad mountain which is so conspicuous in most panoramic views of this portion of the Alps.

With the exception of the inn near Ceresole in the Val Locana, this part of the Alps is very ill provided with accommodation for travellers. Even at Cogne, which only needs a good inn to be a place of much resort, the provision for travellers is extremely limited. Some improvement in this respect is, however, apparent, and every year does something to improve those existing, and to add new inns. In the chief villages of the southern valleys tolerable quarters may generally be found. The valleys that lead to the Val d'Aosta are far poorer, and worse provided. The patois spoken is not easily understood by strangers. The best rule by which to make oneself intelligible is to use French words, applying the Italian pronunciation to each syllable as it is written.



SECTION 13.

LEVANNA DISTRICT — VALLEYS OF
VIÙ, ALA, AND GROSCAVALLO.

BETWEEN the valley of the Orco, or Val Locana, and that of the Dora Riparia, four mountain ridges extend to the eastward from the dividing range of the Alps, and enclose the three valleys of Viù, Ala, and Groscavallo. These valleys communicate with the head of the valley of the Arc by several high glacier passes, which are but rarely used by the natives, and scarcely ever traversed by strangers. The entire district, though said to abound in fine scenery, has been strangely neglected by all but persons locally connected with it. The editor is forced to acknowledge his own want of personal knowledge, nor has he been fortunate in obtaining much information from others. The greater part of the details given in the present section are derived from a work published in Turin in 1823—'Lettres sur les Vallées de Lanzo, par Louis Francesetti, Comte de Mezenile.' The writer, who was a landed proprietor in the district, appears to have been an intelligent observer, but of course his statements, when not resting on his own testimony, do not deserve implicit confidence. Particulars which were doubtless accurate forty years ago may have ceased to be so since, and it is hoped that further and more recent information may be introduced in future editions of this work. The distances given in Joanne's 'Itinéraire de la Savoie' for most of the passes included in this section are considerably understated.

ROUTE A.

TURIN TO LANSLEBOURG, BY LANZO
AND GROSCAVALLO.

	Hrs.' walking	Eng. miles
Lanzo . . .	5½	18½
Ceres . . .	3	9
Groscavallo . . .	3½	10
Col de Girard . . .	4½	10
Bonneval . . .	3½	8
Lanslebourg . . .	4½	13½
	24½	69

Carriage-road from Turin to Ceres—mule-path from Ceres to Forno di Groscavallo—glacier-passes thence to Bonneval, requiring a good guide. The way by the Col di Séa is nearly 2 hrs. longer than that by the Col de Girard.

This is a very interesting route, lying in great part through very beautiful scenery, and involving a choice between two fine glacier passes. This and the following routes are offered to mountaineers passing from Turin into Savoy, as in every way more attractive than the beaten track of the Mont Cenis.

Omnibuses ply several times in the day, between Turin and Lanzo, in 4 hrs. (fare 1 fr.). The road passes through Caselle and Cirié, and as the mountains begin to close on either hand upon the river Stura, the Eremo di Lanzo, an ancient Carmelite monastery, commanding a remarkable view, is seen on the rt.

Lanzo is a small town, about 1,500 ft. above the sea, very beautifully situated at the junction of the Tesso with the Stura, a short distance from the point where the united stream quits the mountains to enter the plain of Piedmont N. of Turin. At Lanzo the Stura has already united in its bed the torrents which drain all the three valleys described in this section, each of which bears the same name as the main stream. The *Stura di Groscavallo* and *Stura di Ala* unite at Ceres to form the *Stura di Lanzo*, which, about 7 m. lower down, opposite Traves, receives the *Stura di Viù*. [A very agreeable excursion may be made from Lanzo to *Coazzolo* and *Monastero* in the *Val di Tesso*, a valley richly clothed with chestnut, walnut, and various fruit trees. From Monastero a path traverses the ridge of the mountain to the W. (about 3,600'), which separates it from Ceres, and there are doubtless other paths over the higher range to the N., leading to Locana in the valley of the Orco (§ 14).] At Lanzo the traveller should not miss seeing the *Ponte della Rocca*, a remarkable bridge, spanning the Stura by a single arch. It was



built in the 14th century, and its history having been forgotten, the skill of the unknown architect has received the popular compliment involved in the name *Pont du Diable*, by which it is often known. On the top of a rocky point, 3,059 ft. in height, and about 1 hr. from Lanzo is the curious sanctuary of St. Ignatius. The church was built round the pointed rock which forms the summit, and this has been left in its natural condition to serve as a pedestal for the statue of the saint.

A fine new road has been lately completed from Lanzo to Ceres, passing along the l. bank of the Stura through exquisite scenery. On the opposite bank, after passing Germagnano, is seen the opening of the valley of Viù (Rte. E), and 5 m. farther on, Mezzenile (Rte. D), a populous village, composed of many scattered hamlets. The population of the Val di Lanzo earn their chief support as nailers, and from an early age the children are brought up to that trade. At the base of the mountain which separates the valley of Ala from that of Groscavallo—here commonly called Val Grande—stands the village of Ceres (2,354'), with two inns. 'The one where we dined was clean and comfortable, the food good, and people civil. One or two carriages are to be met with at Ceres, and ours took $1\frac{1}{4}$ hr. descending the valley to Lanzo—charge 6 fr.'—[F. F. T.] The neighbourhood of Ceres abounds in beautiful scenery, and two or three days may well be spent here. Among other excursions one may be made to the cavern (called in the valley *Creus*) of Pugnetti, and another to the sanctuary of Santa Cristina, perched on an extremely steep rock, 4,549 ft. in height, and commanding a very fine view. On the way from Ceres to Bonzo it is possible to avoid the rough mule-path following foot-paths across the meadows. 'In descending the valley from Bonzo, be careful to quit the path which leads along the l. bank some time before reaching Ceres. Cross the flat, and

traverse the torrent by a long wooden bridge which comes into view before reaching the point where the path divides.'—[F. F. T.] Between Ceres and Groscavallo the valley ascends very gently between richly wooded slopes. Many scattered hamlets are passed, and others are seen half-concealed amidst the rich vegetation. High up on the slope of the mountain to the rt. is the village of *Vonzo* (4,031'), scarcely seen from the path; in the valley below is *Chialamberto*, $1\frac{3}{4}$ hr. from Ceres, and $\frac{3}{4}$ hr. farther, *Bonzo*, where the mountains on either side approach closer to the stream. About a mile beyond Bonzo, near the hamlet of Miglieres, the path to the Col della Crocetta (Rte. C) diverges to the rt., and 2 m. farther, $3\frac{1}{2}$ hrs. from Ceres, is the chief village of the Val Grande.

Groscavallo (3,609'), like most of the villages in this district, composed of numerous scattered hamlets, that containing the church being considered the chief amongst them. The high snowy range enclosing the head of the valley, which has been occasionally seen since the path reached Chialamberto, now comes fully into view, and contrasts finely with the green pastures of the foreground. Walnut trees are still seen to grow here, and extend even as far as the next and highest village, *Forno* (4,056'), about 2 m. farther up the valley. From hence the *Coldi Piccola* leads N. over the ridge to Ceresole in the valley of the Orco.

The upper part of the Val Grande has frequently suffered from formidable landslips, similar in their nature and cause to that of the Rossberg in Switzerland; the last recorded happened on June 2, 1789, and is described in the Memoirs of the Royal Academy of Turin by the Comte Amédée de Ponsillon. It has been apprehended that the valley is again threatened with a similar catastrophe.

At Forno two glacier streams unite to form the Stura, each of them leading to a pass connecting the head of the Val Grande with that of the valley

of the Arc in Savoy. The more direct and less difficult of these is the *Col de Girard*, reached by the rt. hand, or more northerly, of the two upland glens that meet at Forno. After passing the châteaux of Gura, the path approaches the lower part of the glacier descending from the Col. It is said that it was formerly possible to ascend directly by the glacier, but that it has become so crevassed as to be now impracticable. The way now taken mounts to the rt. up the southern slope of the Levanna by extremely steep rocks and slopes of débris. Fully $4\frac{1}{2}$ hrs. from Forno are required to reach the summit, which lies immediately S. of the highest ridge of the Levanna; $3\frac{1}{2}$ hrs. suffice for those travelling in the opposite direction to descend to Forno. The view is said to be very fine. On the W. side of the Col a glacier slopes with a gentle inclination towards the valley of the Arc; it is necessary to bear to the rt. during the descent, and about half-way down the increasing size and number of the crevasses makes it expedient to gain the rt. bank of the glacier, which is one of the principal sources of the Arc. After reaching the highest châteaux a path leads to Écot, and thence to *Bonneval*, which may be reached in rather less than 3 hrs. from the Col, but at least 4 hrs. are required for the ascent on this side.

The pass of the *Col de Séa*, longer and more difficult than that of the Col de Girard, is approached through the wild valley which mounts to the SW. from Forno. At a short distance from the village, on the S. side of the torrent, is the famous sanctuary of the *Madonna del Forno di Groscavallo*, commanding a very fine view of the amphitheatre of rock and glacier enclosing the head of the valley. The church was in 1823 surrounded by a grove of very fine beech, sycamore, and ash trees, which had been spared by the destructive axe of the wood-cutter. The gorge of Séa, through which the track mounts to the highest châteaux, is wild and savage, in places nearly closed by the huge masses

of fallen rock amidst which the path is carried. Above the châteaux a path crosses the torrent, and mounts to the eastward along the steep S. slope to the foot of the glacier, the lower part of which is said to be much crevassed, and exposed to the fall of rocks and ice from the ledges of the *Mont Albaron*, which separates this pass from the Col du Collarin (Rte. D). The upper part of the glacier is easy, and leads to the ridge, usually bare of snow in the month of August. Fully 6 hrs. from Groscavallo, or nearly $5\frac{1}{2}$ from Forno, are required to reach the summit. On the Savoy side a steep slope of névé leads down to the glacier of *Évettes*, descending to the NW. After more than 2 hrs. from the top the glacier is left behind, and an easy but rather long descent by Alpine pastures leads to Écot, and in 2 m. farther to Bonneval. The descent from the summit requires nearly 4 hrs., or in all about 10 hrs. from Groscavallo. Neither of the above passes should be attempted without an experienced guide, and the ordinary requisites for glacier travelling, the rope and ice-axe.

The track from Bonneval to Lanslebourg is described in § 11, Rte. B.

Starting from Turin by an early carriage from Lanzo, it would be easy to reach Lanslebourg in two days by the Col de Girard, sleeping on the way at Groscavallo or at Forno. If taken in the opposite direction it would be necessary to give previous notice to Culet, the innkeeper at Bonneval, who is himself the best guide to these passes, in order to avoid a long delay at Bonneval, which might make it impossible to pass the Col on the same day.

ROUTE B.

BONNEVAL TO CERESOLE—ASCENT OF THE LEVANNA.

Looked at from the side of Italy, the Levanna presents a salient angle, projecting to the E. from the course of the

main chain of the Alps, very much in the same manner as the Monte Viso. The head of the valley of the Arc drains its W. face towards Savoy, and is enclosed between two ridges, both diverging from the topmost peak. That to the SE. is traversed by the Col de Girard, described in the last Rte., while to the NW. another equally high ridge separates the valley of the Arc from the head of the Val Locana. Over this latter ridge lies the pass of the Col de Carro, very little used at present, though conveniently placed for a mountaineer intending to explore the Graian Alps, as in this way he may easily reach Ceresole on the second day from Geneva or Lyons.

Following the rt. bank of the Arc above *Bonneval* (§ 11, Rte. B), the traveller soon reaches one of the most striking scenes of ruin to be found in the Alps. A tract covered with huge broken rocks, called *Clapier de la Talenta*, marks the site of a bergfall which is believed to have overwhelmed the original village of Bonneval. It is said that portions of rude masonry may be traced beneath some of the blocks. About 40 min. above Bonneval is *Écot* (6,775'), the highest hamlet in the valley, where a little rye is sometimes ripened. The ascent continues a little N. of E. along the N. side of a buttress descending from the Levanna, and in 2½ hrs. approaches near to the source of the Arc (8,993'), where a considerable stream fed by the snows of the upper part of the mountain breaks out from the rock. The direct way to the Col leaves this a little to the rt. and mounts towards the NE. in a gorge which finally leads in 1½ hr. farther to the summit of the ridge. The *Col de Carro* is probably about 10,000 ft. in height, but it commands little view, being commanded to the E. and S. by the mass of the Levanna.

The glacier on the Italian side is much crevassed and requires caution. It leads down to the Alp of Cernera, reached in 1 hr. or less, descending from the Col. A little lower down a small

lake is passed, and the track from the Col de Galèse (§ 14, Rte. E) is gained. From thence the way is clear to *Ceresole*, which is reached in about 3½ hrs. from the summit.

The only published account of the ascent of the Levanna is that given by Mr. J. J. Cowell in the first volume of 'Vacation Tourists.' The name of the mountain has evidently arisen in the valley of the Arc, where in the local patois *levana*, or *albana*, means 'in the east.' In the valley of the Orco the mountain is called *Becca a tre Corni*.

Starting from Bonneval at 6 A.M., with Jean Culets, the landlord of the inn there as guide, and with Michel Payot of Chamouni, Mr. Cowell mounted for about an hour to the E., leaving on the l. the track of the Col d'Iséran, when for the first time he gained a glimpse of the summit, hitherto concealed by the high and steep ranges enclosing the head of the valley of the Arc. In 1½ hr. from Bonneval they reached the last chalet, and soon after passed the foot of the glacier descending from the Col de Girard. Here the real ascent commenced: it led to moderately steep snow-slopes, which gradually narrow until they become contracted to a ridge terminating in the summit of the mountain.

This ridge is described by Mr. Cowell as 300 yds. in length, faced on either side by precipitous walls of rock. These precipices do not meet to form an arête, but the higher of the two, which is on the Italian side overlooking the Val Forno, is connected with the other by a steep narrow slope of snow, lying in some places at an angle of 43°. Advancing carefully along this slope, they reached the summit in 5¾ hrs. from Bonneval. From Mr. Cowell's observation of the temperature of boiling water, this appears to be 12,020 ft. in height, and in his opinion it is surpassed by two points in the range to the S.—the Cima di Ciamarella and the Mont Char-donnet. In the absence of means for accurate measurement this conclusion must await further enquiry.

The highest point of the Levanna is formed by a huge slab resting upon a heap of smaller rocks, and on one side projecting over the edge of the precipice on the Italian side. It is not so high as to impede the view, and there is no need to incur the risk of mounting it. The panorama is, as might be expected, very extensive, reaching from the Monte Viso and the Pelvoux (?) to the Bernina and the Orteler Spitze (? probably the Adamello). Although it cannot rank as very difficult of access, it appears that the Levanna has not been ascended more than two or three times.

ROUTE C.

CERESOLE TO LANZO AND TURIN, BY THE COL DELLA CROCETTA.

Mule-path to Ceres, $6\frac{3}{4}$ hrs. Carriage-road from Ceres to Turin, $27\frac{1}{2}$ m.

This is the most direct and shortest way from Ceresole to Turin, and the scenery, if less wild, is perhaps more beautiful than by Locana. From the mineral springs at Ceresole (§ 14, Rte. E) the path crosses the Orco and mounts at first to the S., but before long turns sharply to the E., ascending through a larch wood. On reaching the Alpine pastures above the wood pedestrians may take a short cut which rejoins the mule-path near the foot of the final ascent. The height of the Col della Crocetta is 9,179 ft., according to an observation by Mr. Tuckett, who crossed this pass in 1862, but he considers the result to be over the true height. The summit, which may be reached in $2\frac{1}{2}$ hrs. from Ceresole, is marked by a solid and unusually massive square stone pile, and commands a fine view of the Levanna and the snowy range to the N. In descending it is necessary to keep well to the E. or SE. In 40 min. the first chalets are seen, and it is then merely necessary to follow one

of several paths which descend through the glen, and in $1\frac{3}{4}$ hr. from the top reach the Val Grande, near Miglieres, about 20 min. from Bonzo, or $2\frac{1}{2}$ hrs. from Ceres. 'The scenery of the Val Grande is most charming throughout the portion which I traversed.'—[F. F. T.] The way from Ceres to Turin is described in Rte. A.

ROUTE D.

LANZO TO LANSLEBOURG, BY ALA AND THE COL DU COLLARIN.

	Hrs.' walking	Eng. miles
Mezenile . . .	$2\frac{1}{2}$	$7\frac{1}{2}$
Ala . . .	3	$8\frac{1}{2}$
La Balme . . .	$2\frac{1}{4}$	$6\frac{3}{4}$
Col du Collarin . .	5	12
Averole . . .	3	7
Bessans . . .	$1\frac{1}{2}$	$4\frac{1}{2}$
Lanslebourg . . .	$2\frac{1}{2}$	8
	<hr/> 19 $\frac{1}{2}$	<hr/> 54

The valley of Ala is the narrowest, wildest, and most Alpine in character of the three included in this district. Like the way described in Rte. A, it would be possible to accomplish in two days the distance from Turin to Lanslebourg, supposing that the traveller, arriving on the first day at La Balme, should find a guide competent to lead him over the pass, and ready to start very early on the following morning.

About 6 m. from Lanzo the carriage-road to Ceres is left on the E. bank of the Stura near Pessinetto, and a bridge leads to the opposite bank, along which lies the way to *Mezenile* (2,201'). About a mile beyond Mezenile, at the opening of the valley of Ala, the mule-path turns to the E. through a rocky gorge, leaving on the opposite bank, in the angle between the two streams, the village of Ceres (Rte. A). In the shade of the mountain, which rises steeply on the E. hand, the track passes the hamlet of *Almese*. The Stura continues for several miles to run through a rocky defile, with but few and occasional signs of human

activity, until the path reaches a bridge of a single arch thrown across the river in a singularly picturesque situation. A rather steep ascent on the l. bank now leads to the commune of *Ala*, consisting of a large number of scattered hamlets and groups of farm houses, the chief of which stands at 3,549 ft. above the sea. An extensive iron foundry has been established near the village, and has probably consumed a large portion of the magnificent larches that formerly adorned this part of the valley. In passing one of the hamlets above *Ala* the traveller may remark a small chapel built on the top of a huge block apparently fallen from the mountain above. The walnut trees disappear before reaching *Mondrone* (4,205'), about 1 hr. above *Ala*, near which village is a remarkable waterfall. The *Stura di Ala* first springs over a ledge about 30 ft. in height into a basin which it appears to have scooped out of the rock; escaping from this basin through a narrow cleft, the stream rushes at one bound into a dark chasm, 130 ft. deep, between two perpendicular walls of rock. It is said that the only way to see this fall is to lie flat upon the rock and peep over the precipice. After passing the hamlet of *Chialambertetto*, the last village of the valley, *La Balme* is reached in $2\frac{1}{4}$ hrs. from *Ala*, or $5\frac{1}{4}$ hrs. from *Mezenile*. Standing at a height of 4,845 ft., the village is often almost covered up in snow during the winter, when communication with the lower valley is sometimes interrupted for several weeks. Above *La Balme* the valley appears to be completely enclosed by a range of snow-capped summits, and the narrow gorge lying a little to the rt., and leading to the actual head of the valley, attracts little attention. After crossing to the rt. bank of the *Stura* by a stone bridge, the path mounts on the southern side of this gorge to an extensive grassy basin containing the châteaux of *Mussa* and a small chapel (5,841'). At the farther end of this basin, after passing some scattered larches, a path leads to the *Rocher de Venoni* (6,106')—a large

rock, which has been turned to account in the construction of a châteaux, where several shepherds remain during the summer. From hence the ascent to the *Col du Collarin* commences by an extremely steep path mounting the range of rocks W. of the basin of *Mussa*. When these rocks have been climbed the traveller has before him a fine amphitheatre of glacier, surmounted to the rt. by a range of rugged peaks. The somewhat discordant accounts of this and the neighbouring passes lead to the conclusion that the summit lying between the *Col du Collarin* and the *Col de Séa* is the highest in the range between the *Levanna* and the *Roche Melon*, and that it is known by three different names, viz. *Albaron*, *Punta di Ciama-rella*, and *Mont Taret*. On the E. side of the *Col* the glacier is not difficult, but that which descends on the opposite side towards *Averole* is very steep and much crevassed, so much so, it is said, as to be impassable at times. From the foot of this glacier the descent lies a little S. of W. to *Averole*, a hamlet surrounded by Alpine pastures near the head of a glen which pours a destructive torrent into the *Arc* a short way above *Bessans*. For the way to *Lanslebourg* see § 11, Rte. B.

It is possible to pass from the valley of *Ala* into *Piedmont* by the *Col d'Arnaz*, described in Rte. E. That pass lies at the W. extremity of the range which separates the valleys of *Ala* and *Viù*, and is generally approached through the latter valley. According to *M. Francesetti*, a very steep path diverges to the l. from that leading to the *Col du Collarin* a little above the *Rocher de Venoni*, and in $4\frac{1}{2}$ hrs. reaches a hollow called *Crotas*, completely surrounded by glaciers, from whence an ascent of $1\frac{1}{2}$ hr. leads to the *Col d'Arnaz*.

ROUTE E.

LANZO TO LANSLEBOURG, BY VIÙ.

	Hrs. walking	Eng. miles
Viù . . .	3	10
Usseglio . . .	4	12
Averole . . .	9	18?
Bessans . . .	1½	4½
Lanslebourg . . .	2½	8
	20	52½

The time required is about the same by the Col de l'Autaret and the Col d'Arnaz, the former being longer, but the latter much more difficult. Char-road from Lanzo to Viù; mule-path thence to Usseglio.

About 1½ m. from Lanzo, after passing the village of Germagnano, the Stura is passed by a stone bridge; and the char-road leading to Viù keeps along the rt. bank of the Stura di Lanzo for about 1¼ m. farther to the point where the road, overlooking the junction of the Stura di Viù with the main stream, turns to the l. to ascend the valley. The direction followed is nearly due S. for at least 3 m., till the Stura is passed by a stone bridge, and the road following the bend of the valley mounts to the E. along the l. bank. Many scattered houses and small hamlets are passed, and from time to time the snowy peak of the Roche Melon, seen at the head of the valley, serves to enhance the beauty of the nearer scenery. About 4 m. above the bridge is *Viù*, a large village (2,567'), with several rough country inns and cafés, sometimes visited in summer by pleasure parties from Turin. The mountains to the S., over which lies the way to the Col du Lys (Rte. F) are covered with fine woods; the chestnut prevailing below, and the larch in the upper zone. After a walk of nearly 2 hrs. from Viù, the mule-path, crossing the Stura at Forno di Lemie, and returning about 1½ m. farther on, reaches *Lemie*, whose church, standing on a rock (3,100'), commands a fine view of the head of the valley. A short distance above the village, a small chapel, standing beside a bridge over the Stura

in a singularly picturesque situation, deserves notice. For at least 1 hr. above Lemie the path mounts rather rapidly, and then abruptly enters on the plain of Usseglio, evidently the filled-up bed of an ancient lake, covered with fields and meadows which contrast finely with the Alpine scenery of the background. Unfortunately the natives have recklessly destroyed the forests which once surrounded the upper end of the valley, and fuel is now scarce. Several hamlets forming part of the commune of *Usseglio*, lie upon this plain which is nearly 3 m. in length. At the W. end are the church (4,215'), where is preserved a Roman altar with an inscription to Hercules, found on the mountain of Bella Comba, and the parsonage, where a traveller may probably obtain lodging; but it seems more advisable to sleep at some of the chalets higher up in the valley.

A short distance beyond the church is a large building called the *Fabbrica*, intended for the preparation of the cobalt obtained from a mine in this neighbourhood. Here the valley of Viù may be said to terminate at the junction of two torrents of about equal volume. That flowing from the NW., called *Stura di Arnaz*, leads to the Col of that name, which is the most direct but difficult way to the valley of the Arc. The torrent flowing from the SW. is the *Stura di Usseglio*, fed principally by the glaciers of the Roche Melon, and through that branch of the valley lies the way to the Col de l'Autaret, the least difficult of all those traversing this part of the main chain of the Alps.

1. The path leading to the *Col d'Arnaz* ascends the NW. branch of the valley, reaching in about 1 hr. the *Châlet de Peillot*, and then mounts a steep rocky barrier called *Pas de la Scala*, above which a passage partly cut through the rock, as expressed in the name *Tajà de Fer*, leads into the wild upland basin of *Bella Comba*, surrounded by ice-bound ridges of rock. Here an iron mine was formerly worked, and it is far more probable that the

Roman altar and inscription preserved at Usseglio should be connected with the mine, than with the existence of a pass used at that early period, as some writers have conjectured. The much easier route by the Col de l'Autaret, would in all likelihood have been preferred by the Romans, as it has been in more modern times. Another steep ascent over a rocky barrier of forbidding aspect conducts the traveller to the last step in the ascent. This is occupied by the *Lago della Roussa*, lying immediately under the fine peak of the *Aiguille de la Roussa*. This lake is completely frozen over, except for a short period during the height of summer, and even then it usually has considerable masses of ice floating on its surface. It is reached in about 5 hrs. from Usseglio. From the lake the ascent lies over glacier covered with snow or névé according to the season, and this leads in about $1\frac{1}{2}$ hr. to the Col, which is a narrow passage through the crest of the ridge, 10,233 (?) ft. in height. The descent lies to the E. over another glacier, and when it becomes necessary to quit the ice and descend along the moraine, the way is sometimes rendered dangerous by the fall of blocks detached from the surface of the glacier. About $2\frac{1}{2}$ hrs. are required for the descent to *Averole*, 4 hrs. from Lanslebourg (see last Rte.).

2. To reach the *Col de l'Autaret* from Usseglio it is necessary to follow the track along the l. bank of the Stura di Usseglio, through the SW. or l. hand branch of the valley, passing the hamlet of Margone (4,625'), beyond which is a fine waterfall. In 2 hrs. from the village the traveller may reach the châteaux of *Malciaussia* (5,896'), finely placed at the base of the Roche Melon, surrounded by pastures and fields of rye, which in some years ripen fully at this great height, after the seed has remained for 14 months in the ground. It would probably be possible to ascend the Roche Melon direct from these châteaux, but the peak on this side is extremely steep, and the peasants who

make the pilgrimage always pass by the Col della Croce di Ferro (see next Rte.).

The *Col de l'Autaret*, of which the ascent commences here, is a pass of great antiquity, possibly known to the Romans, and is said to have been at one time traversed by a postman, who conveyed on horseback the letters from Turin into Savoy. Whether or no there be sufficient evidence of this, the tradition is consistent with those of a similar nature which subsist in many parts of the Alps. It is indeed asserted in Joanne's 'Itinéraire de la Savoie,' that the pass may now be traversed on muleback; but the editor is assured by one who has traversed the pass, that this in its present condition would be absolutely impossible. A path mounts along the Stura, first by the l. bank, and then by the opposite side, and disappears, after passing the highest pastures, when the ascent is continued by very steep rocks, supporting the uppermost shelf of the valley, whereon rests the *Lac de l'Autaret*. During the greater part of the year this lake is not visible, either because its bed is occupied by the glacier, or owing to its being completely bridged over by ice and névé. In some seasons it is not seen until the month of August. Above the lake, the glacier extending to the Col is rather steep, and it is usual to make a bend to the l. to avoid the steepest part. The summit, marked by a gneiss rock projecting through the ice, is said to command a very extensive view. Its height is probably about 8,500 ft., and it may be reached in 4 hrs. from Malciaussia. The descent on the W. side is rather long, but presents no difficulty. On reaching the base of some rocky slopes a path is seen, which leads in about 3 hrs. from the Col to *Averole*.

ROUTE F.

PASSES LEADING TO AND FROM THE
VAL DI VIÙ.

Besides the two passes connecting the

Val di Viù with Savoy described in the last Rte., there are several others by which it communicates with the Val di Ala on the N., and the valley of Susa to the S. These are here enumerated rather than described, with the hope that future travellers will supply additional information.

1. *Col di Cialmetta, from Mezenile to Viù.* A somewhat circuitous path, passing several hamlets, mounts from Mezenile to the summit, where a small chapel (4,340') marks the limit between the two valleys, and commands a fine view on both sides. A steep path descends the bare mountain slope towards Viù, and another longer and easier winds through a forest. About 3 hrs. are required to reach Viù.

2. *Col de Trélalet, from Ala to Viù or Lemie.* The slope of the mountain towards Ala was formerly covered by a very extensive forest, which has in great part disappeared, owing to the consumption of fuel at the iron foundry, and through the ill-management of the communes. The descent on the S. side to Lemie is said to be much steeper than to Viù.

3. *Pass from La Balme to the head of the Val d'Arnaz.* M. Joanne, in his 'Itinéraire de la Savoie,' speaks of this pass by the name Col de la Croix de Fer, but that name belongs to the pass mentioned below, leading from Malciaussia to Susa. Two passes in the direction indicated are, however, laid down in the Piedmontese War Office map.

4. *Col della Croce di Ferro, from Malciaussia to Susa.* A steep ascent of $1\frac{1}{2}$ hr. leads to the summit (8,271'), which commands a magnificent view over the Combe de Susa, and the ranges of the Cottian Alps. From hence it is possible to descend to Susa by the chalets of Trucco, or to pass along the steep S. face of the mountain to the Cà d'Asti, and thence reach the summit of the Roche Melon in $4\frac{1}{2}$ hrs. from the Col (see § 7, Rte. B).

5. *Col du Lys, Viù to Rubiana.* An ascent of 1 hr. to the S. leads from Viù

to the picturesque village of *Col di San Giovanni*. From thence a walk of 3 hrs. suffices to reach *Rubiana*, from whence the rly. stations of Avigliana or Condove on the line from Turin to Susa are either of them distant about 2 hrs. Another way to Turin is by a pass leading from Col di San Giovanni to *Val della Torre* in 4 hrs., and thence to *La Veneria*. SW. from the village of Col di San Giovanni is the *Monte Civrari* (7,261'), one of the finest points for a panoramic view in the neighbourhood of Turin. It may be reached in 5 or 6 hrs. from Viù, and the descent to Rubiana requires 3 hrs.

SECTION 14.

PARADIS DISTRICT.

In the introduction to this chapter the district included in the present section has been defined with tolerable accuracy. The group of high Alps, whose culminating point is the Paradis, may be described as a triangular mass enclosed between the valley of the Orco, the Val Savaranche, and the track which passes from the Val d'Aosta through the Val de Cogne, over the Col della Nouva, and down the Val Soana to Ponte on the Orco. The two first-named valleys completely separate this from the Levanna and the Rutor districts; but to the W. of the Val Soana and the Val de Cogne is an outlying group whose highest points are the *Pointe de Tersiva* (11,503'?) and the *Mont Emilius* (11,677'), and which may be considered as an appendage of the mass of the Paradis.

Within the last few years the accommodation for strangers in this district has been considerably improved, and it may be hoped that this will be farther extended as its attractions become more widely known. In the Val Locana

there is an inn near the mineral springs of Ceresole, affording tolerable headquarters for a mountaineer. At Val Savaranche a decent little inn has lately been opened; and at Cogne, which is the natural centre of the district, though the accommodation is limited, a traveller bent on exploring the grand scenery of the neighbourhood who will apply to the *curé*, M. Chamonin, himself a good mountaineer, will be sure of obtaining useful advice, and will be directed to the best available quarters.

In the Val Locana and its tributary valleys the Piedmontese dialect of Italian is spoken, but in the lateral valleys of the Val d'Aosta, and throughout that province, the native language is a French patois, resembling that spoken in Savoy.

ROUTE A.

TURIN TO AOSTA, BY THE VAL SOANA AND VAL DE COGNE—ASCENT OF THE GRIVOLA.

	Hrs.* walking	Eng. miles
Ponte	9 (?)	30 (?)
Campiglia . .	4	12
Col de la Nouva .	3	7
Cogne	4½	12
Aosta by Pont d'Ael	5½	17
	25½	78

Omnibus from Turin to Ponte, mule-path to Campiglia, foot-path thence to Cogne, rough char-road from Cogne to Aosta. The journey may be made in two days by a traveller who will put up with the wretched accommodation to be found at Campiglia; but it is a better arrangement to sleep at Cuorgné or Ponte, and at Cogne.

The country diligence, or omnibus, employs 6 hrs. between Turin and Ponte, passing through a richly cultivated country with many thriving villages and small towns, to *Cuorgné* (Inn: Leone d'Oro, very fair), a rather large manufacturing town at the opening of the *Val Locana*, or valley of the Orco. About 1 hr. farther is

Ponte (Inn: Al Valentino, tolerably

good but rather dear), a village 1,589 ft. in height, which has grown into a town since the establishment of a large cotton mill. It is most beautifully situated at the junction of the Val Soana with the Orco, and an afternoon may be very well spent in strolling about the neighbourhood, where every eminence commands noble views of the two valleys and the snowy chain which encloses them. A ruined tower on a steep knoll, and the church of Santa Maria, about ½ hr. below Ponte, are indicated as particularly well worth a visit. *Campanula Elatines* is found in shady spots near the river. The ascent of the Val Soana commences immediately after passing the cotton mill on the N. side of the town. This most picturesque glen, through which an abundant torrent rushes down between steep rocks amid the shade of fine old chestnut trees, with occasional glimpses of the plain of Piedmont or of the higher mountains around, is traversed by a paved mule-path, rather fatiguing to the feet, especially when descending. At *Ingria* the valley opens somewhat, and several hamlets are seen on either bank of the torrent. In ascending the valley 3½ hrs. are required to reach Ronco (3,090'), where coffee or wine may be had at a wretched inn, and, in case of need, beds for the night. 'Hunger and fatigue alone can make it endurable.'—[M.] [Just before reaching Ronco the opening of the *Val di Forzo* is passed on the l., through which a track leads NW. to the *Col de Bardonney*, passing on the W. side of the *Punta di Lavina* (10,824'), and seemingly the most direct way from Ponte to Cogne. The Col is an opening in the rocky ridge but 6 or 7 ft. wide, and about 9,680 ft. in height. To the W. are two peaks, called on the large map *Pointe des Fourches* and *Pointe des Sengies*; between these and the Tour de St. Pierre is the Col de Telleccio, a glacier pass mentioned below. The descent on the Cogne side is over the *Glacier de Bardonney*. Further information is desired.]

At Ronco the main valley, which has hitherto risen towards the NW., turns due N. for about 2 m. to the junction of the torrent descending from the Col di Reale (see below). The six-sheet map of Piedmont, which, though often at fault in the upper region, has been made in the later editions tolerably correct as to paths and villages, places a village named Valprato at the junction of the two valleys. This is an error likely to mislead a stranger, as the hamlet of Valprato, or Val Prà, is at the S. foot of the Col di Reale, 2 hrs. above the junction, and the hamlet which stands at the place so named in the map is called *Cordonera*. It may be well at the same time to point out another error in the same map, which is also likely to lead a traveller astray. At the head of the Val Campea two passes to Cogne are shown, of which the l. hand pass is called Col dell' Arietta, and that to the rt. Col della Reale. There is no doubt that the latter of these, as laid down on the map, is the true Col della Nouva, while both the names above quoted properly belong to one and the same pass (hereafter noticed) which lies several miles to the eastward, at the head of the other branch of the Val Soana.

Above Cordonera the NW. branch of the valley, called *Val Campea*, leads in about a mile to the poor hamlet of *Campiglia* (about 4,200'), reached in $4\frac{1}{2}$ hrs.' steady walking from Ponte. The descent occupies about $3\frac{1}{2}$ hrs. There is no inn, but lodging can, or could formerly, be found for the night, not worse than that at Ronco. Walnut trees are still seen at this unusual height. The head of the Val Campea, commanded on the W. side by the fine peak of the *Punta di Lavina*, presents a grim and savage appearance, and the aspect of the rocky barrier below the Col promises a difficult climb. The ascent, though long and rather steep, presents, however, no obstacle worthy of notice, and the botanist will find the way shortened by meeting many interesting plants, among which *Saponaria lutea* and *Silene vallesia* are con-

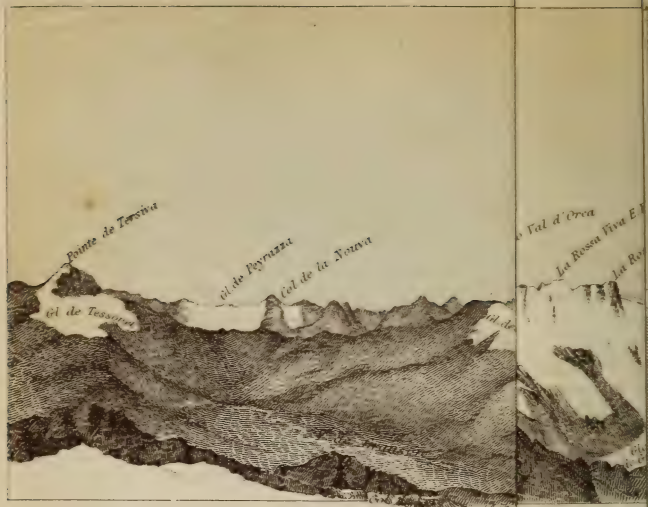
spicuous. It is necessary to keep well to the rt., especially towards the top, which in ascending from this side is fully $3\frac{1}{2}$ hrs. from Campiglia; but 3 hrs., or even less, suffice for the descent.

The *Col della Nouva*, 9,664 ft. above the sea, according to the mean of observations taken by M. Favre and Mr. Bonney, commands a very grand view of the range of Mont Blanc on the one side, and on the other looks over the Val Soana to the plain of Piedmont, and the Montferrat hills beyond Turin. The name *Col dell' Arietta* is often given to this, as well as to two or three other passes in the same neighbourhood, but the name here used is the ancient and correct designation, the pass being called *Fenestra Nova* in Latin documents of the 11th century. By mounting a few hundred feet to the W. of the Col, this view becomes a panorama, which includes most of the principal peaks of the Graian and Pennine Alps. The descent on the N. side lies for about 20 min. over a small glacier, in part rather steep, but quite free from difficulty. When covered with snow the rope should not, however, be neglected, as the crevasses are sometimes numerous, or else the descent should be made along the rt. bank, avoiding the ice. Below the glacier the way lies along a rocky ridge, with little trace of path. To the rt. is seen the pass of La Fenêtre de Cogne, leading to the Val Champorcher and the Col di Reale, and in about $1\frac{1}{4}$ hr. descending from the Col della Nouva, the traveller gains the well-marked path leading from the first-named Col to Cogne, near to the chalets of Chavanis. Near here, on stony slopes of débris, is the only known habitat of a curious plant—*Aethionema Thomasianum*. A rather steep path is carried along the N. slope of the Val de Cogne, which descends about due W., and soon enters the region of the larch. In approaching the lower level of the valley, the path traverses a considerable ridge, which is either the remains of a great landslide or an

ancient moraine of large size, and a little farther reaches the level of the plain of Cogne. On the way a lateral glen—the *Combe de Valeiglia*—closed by a fine glacier of the same name, shows towards the S. the peak of the *Tour du Grand St. Pierre* (12,064'), and leads to Locana by the *Col de Telleccio*. Nearer to Cogne is the opening of the more considerable glen of Valnontey, leading to the *Col de Grancrou* (Rte. G), between the *Rossa Viva* and the *Grand Paradis*. After crossing to the l. bank of the torrent by a solid bridge, a good road, nearly level, leads in $2\frac{1}{2}$ hrs., descending from Chavanis, to Cogne, the chief village of the valley, just 5,000 ft. above the sea, long known for its considerable mines of rich iron ore. The only inn was closed in 1862, but travellers could lodge in an old tower containing one or two decent rooms, and, by reference to the *curé*, would obtain food and necessaries. P. Jacquin, a garde-chasse and good mountaineer, lives in the same building. The *curé* of Cogne, M. Chamonin, has been one of the most persevering and successful explorers of the *Grivola* (see below), and his information and advice should be sought by anyone wishing to undertake new expeditions among the neighbouring peaks and glaciers. The iron mines, which have been abandoned during the last few years—not from deficiency of ore, for this is believed to be inexhaustible, but owing to the heavy expense of working at so great a height—are about $2\frac{1}{2}$ hrs. from Cogne, and are said to be well worth a visit. The excursion which is sure to attract most visitors to Cogne who may not think of attempting the comparatively formidable ascent of the *Grivola*, is that to the rocks of *Le Poucet*, also written *Les Poussets*, well known to most English readers by the interesting account of it given in Mr. King's 'Italian Valleys of the Pennine Alps.' Though rather laborious for a lady, it will be considered by a practised pedestrian but a very moderate expedition. Less than a mile below Cogne, at

the hamlet of Cretaz, a narrow glen opens to the SW., through which a mule-track mounts some distance, and then turns to the l. towards the *Châlet du Poucet*, 8,248 ft. above the sea, about 3 hrs. from Cogne. On the way the traveller passes amidst ice-rounded domes and bosses of rock. A short distance above the *châlet* commences a long and steep ascent of about 1,800 ft., chiefly over *débris*, called in this part of Piedmont *clappey*, reaching up to the ridge which commands so remarkable a view of the peak of the *Grivola*. This is separated from the base of the pyramid by the upper basin of the *Glacier of Trajo*, and the interval thus placed between the spectator and the wonderful object standing before him very much enhances the effect. The only way in which any idea can be formed of a scene so much out of ordinary experience is by comparison with others that have some points in common. Probably the two views that will occur to Alpine travellers in connection with this are that of the *Matterhorn* as seen from some points on the ridge of the *Théodule* pass, and the *Gross Glockner* from the *Hohenwartscharte*. The *Matterhorn* is altogether a more colossal peak, and in the dimensions as in the plan of its *Titanic* architecture quite unrivalled, either in the Alps, or, as far as we know, elsewhere in the world; but it has not the peculiar gracefulness of form that characterises the aspect of the *Grivola*, nor does the eye take in its plan and proportions so complete. The *Gross Glockner* is a far nearer likeness to the *Grivola*. The height of both is about the same, differing by only 87 ft. Both are pyramidal peaks, laterally compressed, so that their faces are of unequal width. Of the *Glockner* the S. and W. faces—of the *Grivola* the N. and E. faces—are snow-slopes of extreme length and steepness, while the opposite faces consist mainly of rock. But while the *Glockner*, as seen from the SW., is still sharper and perhaps more elegant in form, there is





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not any point of view from whence it is so well seen as the Grivola is from the Poucet. The Hohenwartscharte is a point in a snowy ridge which rises continually towards the base of the pyramid, while from the Poucet the level space of the upper glacier of Trajo furnishes the desired contrast, enabling the eye to measure the steepness of the peak. From 9 to 10 hrs. exclusive of halts should be allowed for the excursion to the Poucet and the return to Cogne.

The ascent of the Grivola is to the aspiring mountaineer who loves the excitement of climbing lofty peaks the grand object of a visit to the Val de Cogne. If we look to the main ridges that sustain the glaciers and snow-fields of the upper region, we may say that the skeleton of the central triangular mass forming the nucleus of the Graian Alps consists of three ridges, which diverge from the Grand Paradis as a centre. The south-western and least considerable of these, including the summits of the *Cima di Charforon* and *La Cocagna*, terminates at the pass of La Croix de Nivolet. The eastern ridge, which culminates in the Tour de St. Pierre, is limited by the Col della Nouva, unless we consider the range which separates the Val Champorcher from the Val Soana as its eastern prolongation. The northern ridge rises at first into the fine points called Pointe de l'Herbetet and La Grande Serre, then sinks a little to the Col de Lauzon, and rises at its N. extremity to confront the great range of the Pennine Alps in the daring and beautiful pyramidal peak of the Grivola, or *Corne de Cogne*. Although it is conspicuous in all the distant views of this region by its great height and remarkable form, it is so far buttressed round by minor masses that it is not well seen from the valleys of Cogne or Aosta, and this circumstance has perhaps been the cause of the neglect with which it had been treated by Alpine travellers until within the last few years. The direction in which the ascent of the

Grivola appears least difficult is along the S. ridge, formed of rock alternating with very steep snow-slopes. It was by this way that Mr. Tuckett made his first attempt, accompanied by four guides; and the failure of the expedition, after passing the night at a height of more than 12,000 ft., proved the impossibility of effecting the ascent in that direction. The next attempt was made, like the preceding one, from the side of Val Savaranche, by Messrs. J. Ormsby and R. Bruce, with Ambroise Dayné, and J. Chabot, two gardes-chasse of that valley, Zachary Cachat of Chamouni, and Jean Tairraz, landlord of the hotel at Aosta, as guides. The ascent was accomplished by one of several formidably steep gullies, or couloirs, which furrow the SW. face of the peak, and lead up to the highest ridge, but not, as it would appear, to the highest point of that ridge. Both these expeditions, made in 1859, are described in the Second Series of 'Peaks, Passes, and Glaciers.' In August 1861, Messrs. W. Mathews and Jacomb attempted to repeat the ascent by the same route as that taken by Mr. Ormsby, but their guide, Jean Tairraz, who had joined in both the preceding expeditions — was unable to retrace the exact way by which the previous ascent had been effected. About a fortnight later, M. Chamonin, the *curé* of Cogne, who had already made two attempts which served to set him on the right track, reached the highest point of the mountain by a route which seems to present no unusual difficulties, and will doubtless be adopted by all future travellers. Starting from the Châlet du Poucet at 4 A.M. with a chasseur named Pierre Jacquin, and P. Perrod, a herdsman, they climbed for $\frac{1}{2}$ hr. along the ridge of Le Poucet, and reached the edge of the *Glacier de Trajo* at 6 A.M. One hr. sufficed for the passage of the glacier to the base of the peak, and $2\frac{3}{4}$ hrs. for the final climb, which led them to the top at 9.45 A.M. The descent to the ridge of the Poucet occupied 3 hrs., and 4 hrs. more took



the party to the village of Cogne. The result has been to bring the ascent of one of the most remarkable peaks of the Alps within the reach of all practised mountaineers. In 1862 the summit was reached by Mr. Tuckett, and again by Messrs. Mathews and Bonney; the latter gathered *Campanula cenisia* at a height of 12,047 ft. The peak is composed of crystalline slates, in which chlorite and mica alternately predominate. We adopt provisionally the height derived by Mr. Mathews from a careful discussion of his own and other observations—13,028 ft.

For the routes from Cogne to Aosta by the Col d'Arbole and the Becca di Nona, or by the Mont Emilius and the Val de Grauson, see Rtes. B and C. The passes leading to the Val Savaranche are little known, and further information is much desired. Those presenting least difficulty are the *Col des Rayes Noires* (about 9,680'), and the *Col de Lauzon* (about 9,500'), both reached from Cogne by the Vallon de Lauzon. The latter and more southerly of the two is sometimes called *Col de la Combe de Cogne*. Farther S. and close to the Grande Serre is the *Col de l'Herbetet*, about 10,000 ft. in height. On the N. side of the Grivola the *Col de Mesoncles* offers another practicable pass to the Val Savaranche.

The Val de Cogne, which opens out to give space for cultivation in the neighbourhood of its chief village, is soon hemmed in between the mountains on either hand, and for a great part of the descent to the Val d'Aosta it is narrowed to a mere gorge, through which the torrent forces its way often at a considerable depth below the char-road which traverses *Epinel*, *Silvenoir*, and one or two other small hamlets. The valley, which had descended from its head to Cogne about due W., gradually bends to NW., and at last the narrow ravine which leads down to the Dora turns directly to N. The road is here carried along the rt. bank, and on the shoulder of the mountain by which it quits the valley it is fully 1,000 ft.

above the stream. Thence it winds down to *Aimaville*, where an ugly modern sham castle commands a very fine view of the valley between Villeneuve and Aosta. An agreeable path along the rt. bank of the Dora, much preferable to the high-road on the opposite bank, leads to Aosta by *Jovençeau* and *Gressan*.

The pedestrian should make a slight detour to visit the remarkable bridge of *Pont d'Ael*, sometimes written *Pontel*. This is reached by a path turning down to the l. a short distance before the opening of the Val de Cogne into the Val d'Aoste. A steep descent leads down to the little village where the torrent, issuing from the Val de Cogne, is spanned, at a height of 400 ft., by an arch intended to serve the double purpose of bridge and aqueduct. A Roman inscription, still perfectly fresh, seen over the arch on the N. side of the bridge, records its construction in the 13th year of Augustus. Below the road a vaulted gallery, which formerly served to convey water, is carried across the arch, one entrance being in the village, the other on the opposite bank. From Pont d'Ael, which is 3 hrs. from Cogne, the pedestrian may reach Aosta by Aimaville in 2½ hrs., or if his course be towards Courmayeur, he will find a track which leads in 1 hr. over the N. end of the ridge separating the Val de Cogne from Val Savaranche to Villeneuve (§ 15, Rte. A).

In addition to other very rare plants already noticed, many others have been found in the Val de Cogne—e.g. *Astragalus alopecuroides*, *Valeriana celtica*, *Linnæa borealis*, &c.

Between the head of the Val de Cogne and that of the Val Soana another way may be taken, nearly 2 hrs. longer than that above described, perhaps equally interesting, and less difficult in bad weather. Above Ronco, and near the hamlet of *Cordonera*, a branch of the Val Soana, as has already been mentioned, diverges to the rt. or NNE., and leads to the ridge separating the basin of the Orco from the Val

Champorcher. The highest hamlet is *Valpra*, or *Valprato*, fully 6 hrs. from *Ponte*. 'If the traveller arrive late, the worthy old peasant, *Giuseppe Danna*, will give him his best welcome.'—[M.] N. of *Val Pra* is a pass called *Col di Reale*, or *Col de Champorcher*, commanding a remarkably fine view of the Pennine chain and of part of the Graian Alps, but scarcely equal to that from a point above the *Col della Nouva*. According to *M. Chamoin*, the pass here called *Col di Reale* should bear the name *Col dell' Arietta*, but that name has been applied to so many neighbouring passes that it may best be disused in future. The *Col di Reale* overlooks the upper end of the *Val de Champorcher*, and following the track down that valley, the traveller may reach *Bard* from *Ponte* on the same day. By bearing to the l., and remounting to the chapel of *Notre Dame de la Neige*, he will fall into the track from *Bard* to *Cogne* noticed in *Rte. D.* and after traversing the pass of the *Fenêtre de Cogne*, may join the path from the *Col della Nouva* near to the *châlets* of *Chavanis*. To reach *Cogne* from *Ponte* by this route is a long day's work, requiring 13 hrs.' steady walking, exclusive of halts.

ROUTE B.

AOSTA TO COGNE, BY THE BECCA DI NONA AND COL D'ARBOLE.

13 hrs.' walk, exclusive of halts.

The *Becca di Nona* is now well known to most Alpine travellers as offering one of the finest panoramic views—some think *the* finest—in the entire range of the Alps. This peak, 10,384 ft. in height, nearly due S. of *Aosta*, and about 8,500 ft. above the city, commands the entire southern declivity of the Pennine Alps from *Mont Blanc* to *Monte Rosa*. The principal peaks of the Graians are still nearer at hand, while there is not in its immediate neighbourhood any taller rival except

the *Mont Emilius*, which fortunately does not cut off the most interesting portion of the horizon. It is to the *Chanoine Carrel* of *Aosta*, who has done much besides to illustrate his native valley, that the public are indebted for a knowledge of this admirable point of view, and the lithographed panorama which he has published, and which is found on sale at *Aosta* and in *Turin*, serves as a guide to those who, reaching the summit with favourable weather, would study the topography of this, the grandest part of the Alpine chain. The name *Pic Carrel* has been very deservedly given to the peak by some local writers, and the name has been adopted by the officers of the *État-Major* at *Turin*. We have, however, retained the designation generally known to travellers and to the people of the valley. The usual course is to ascend from *Aosta*, and return thither on the same day. Even to those who have made that excursion, the way to *Cogne* by the *Col d'Arbole* is strongly recommended as an independent expedition; but an active mountaineer may easily combine the two in a single long day's walk, which can scarcely be surpassed for grandeur and variety of scenery. It is hard to say whether the expedition may more advantageously be made from *Aosta* or from *Cogne*, as the views during the descent on either side are such as no one would willingly lose; but the second is certainly the less laborious alternative, as the ascent is reduced by fully 3,000 ft. On the other hand, those who object to so long a walk may ride from *Aosta* to within a short distance of the summit, and this circumstance has permitted many of our countrywomen to enjoy the ascent, of which one of them has given an interesting account in the pleasant volume called '*Alpine Byways*.' For that wise minority of travellers who allow themselves time to enjoy fully the beauties of nature, and who have pursuits which give them an additional motive not to hurry over the

ground, the best arrangement will be to ascend the Becca di Nona from Aosta, sleep at the châteaux of Comboë, and pass on the following day to Cogne. The experienced mountaineer is aware that an ascent of nearly 8,500 ft. cannot be accomplished without labour, and will therefore be careful to make an early start from Aosta. For the Becca di Nona a guide is scarcely required, as the mule-path serves to direct the way, but local knowledge can scarcely be dispensed with for the pass to Cogne. In making the route from Cogne it would be sufficient to engage a guide as far as the summit of the Col d'Arbole, as from that point a mountaineer will have little difficulty in finding his way.

After crossing the Doire on the S. side of the town of Aosta, the ascent commences almost immediately to the village of *Charvensod*, where a guide may easily be procured for the remainder of the ascent. From thence, amid near scenery and distant views of continually increasing beauty, the mule-track winds up the slopes which lead past the hermitage of St. Grat and the hamlet of Chamolé, and finally across a ridge which forms the N. boundary of an upland valley containing the pastures and châteaux of *Comboë* (about 7,000'). These belong to the Chapter of Aosta, and travellers are indebted to the Chanoine Carrel for having had one of them fitted up with a good room, clean straw, and a fireplace, and furthermore for the good path which leads from hence to the summit of the mountain. Permission to sleep in his house at Comboë, is kindly given by M. Carrel, when it is not required by himself or his friends. To describe the view from the summit of the *Becca di Nona* would involve a catalogue of the peaks of the Pennine and Graian Alps, which is best supplied in the panorama given with the next route. Those who wish to combine with the ranges of the Alps a wide prospect of the plains of N. Italy, must ascend the higher and more distant peak of Mont Emilius (Rte. C), but it may be doubted whether the

view from the summit of the Becca plunging into the rich Val d'Aosta, which seems to lie immediately at the traveller's feet, does not more than compensate for this partial disadvantage.

In the second series of 'Peaks, Passes, and Glaciers,' Mr. Tuckett has described a route from Aosta to the summit of the Becca di Nona, which seems to be, if possible, more beautiful than the ordinary way. Future visitors from Aosta will do well to mount by this new path and descend by the usual track. Taking a pathway which turns to the l. above Charvensod, he mounted SE. towards Les Pouces at the NE. foot of the Signal Sismonda, and after rounding the base of a spur from that peak which cuts off the view of the Upper Val d'Aosta, he entered the head of the glen of the Dard, which forms a beautiful cascade below the dark mass of the Becca di Nona, with the Matterhorn closing the view to the NE. In the lower part of the gorge of the Dard are some curious natural pillars, figured by Mr. Jacomb in 'Peaks, Passes, and Glaciers.' A pathway along a watercourse leads to the cascade, and the ascent continues by the slopes E. of the stream, past the Chalet de Pontelle, and up to a grassy ridge or col overlooking the pastures of Comboë.

Travellers who take mules from Aosta or Charvensod employ 6 hrs. in the ascent and 5 hrs. in the descent, exclusive of halts at Comboë and on the summit. An active pedestrian may somewhat reduce the time in ascending, and save $1\frac{1}{2}$ hr. in the descent.

Those who take the Becca di Nona on the way from Aosta to Cogne need not return to the châteaux of Comboë. Mr. Tuckett, who made the excursion with Victor Tairraz, of Chamouni, and Jean Tairraz, the innkeeper of Aosta, descended as far as a point named Gros Cez, and then turning to the l. gained in $1\frac{1}{2}$ hr. from the peak the ridge SE. of Comboë, separating that Alp from the pastures of Arbole. The head of this upland glen bends SE. towards

the Mont Emilius, but the proper course lies about due S. to a gap in the opposite ridge, which is reached across heaps of débris, passing two small lakes, and finally by pretty steep snow-slopes. This is the *Col d'Arbole*, also called *Col d'Arpisson*, about 9,300 ft. in height, reached in $2\frac{1}{2}$ hrs. from the summit of the Becca, and in $1\frac{3}{4}$ hr. from the châteaux of Comboë. The view from the pass, says Mr. Tuckett, was one of unexpected sublimity. Beyond the deep chasm of the Val de Cogne the noble forms of the Grand Paradis and the Grivola are seen in full grandeur. The descent on the S. side lies at first over débris, and then over a pasture, to some châteaux, beside which stands the Croix d'Arpisson. This is beautifully situated, immediately overlooking the village of Epinel in the Val de Cogne, and the view of the Grivola is said to rival that of the Jungfrau from Mürren. A path zigzags down the mountain through a pine-wood, and in $2\frac{1}{2}$ hrs. of rapid descent from the Col leads to another châtlet. Instead of descending to Epinel the traveller bound for Cogne should here take a path to the l. which reaches Crétaz in $\frac{3}{4}$ hr., and in 15 min. more the village of Cogne. Travellers who fear fatigue may content themselves with the ascent of the *Signal Sismonda* (8,353'), one of the main buttresses of the Becca di Nona, and thence reach Cogne by the Col d'Arbole, or by the *Col de la Vallette*, about equal in height, and also commanding a noble view.

ROUTE C.

AOSTA TO COGNE, BY THE MONT EMILIUS AND THE VAL DE GRAUSON.

The Mont Emilius is the highest summit of the range, or rather group of mountains, lying NE. of the Val de Cogne. It is not likely to be so much frequented as the Becca di Nona, not merely because the ascent is longer and more laborious, but because the view,

although more completely panoramic, loses one main feature, inasmuch as it does not plunge so directly into the Val d'Aosta, from which the Mont Emilius is partly separated by the Becca di Nona and by portions of the lower ranges E. of that peak. The excursion is, however, full of interest, and by ascending on the preceding evening to the châteaux of Comboë, and sleeping there, there is no difficulty in reaching Cogne in good time on the following day.

The editor has been favoured with notes of the ascent made by Mr. W. Mathews and by the Rev. T. Bonney on the 12th of August, 1862.

Starting at 4.40 A.M. from the Châteaux de Comboë, they followed the upland valley which bends to the E. along the S. side of the Becca di Nona to the Châteaux d'Arbole (8,228'); these were reached in 55 min. The head of the glen is closed by a small glacier lying between the Mont Emilius on the l. and the Pointe de Garin on the rt. Two hrs. sufficed to reach the base of this glacier, above the small Lac d'Arbole, which must be one of the highest in the Alps, as the spot near the glacier where the party halted for breakfast was found to be 10,003 ft. above the sea. In crossing the glacier they bore to the l. in the direction of the Mont Emilius, and after mounting a steep face of rocks soon reached the arête, formed of steep and shattered rocks, which led in 1 hr. from their halting-place to the summit, which by the latest observations of the Piedmontese engineers is 11,677 ft. in height. The annexed panorama, for the S. part of which the editor has to express his obligations to Mr. Bonney, will give some idea of the magnificent view, certainly amongst the very finest in the Alps. The precipices on the side facing the Val d'Aosta are of extraordinary height and steepness, and the city is seen apparently at the base of the mountain. *Saxifraga bryoides* and *Androsace glacialis* were found close to the summit.

After placing a mercurial minimum

thermometer in the cairn which was found at the summit, Messrs. Mathews and Bonney re-descended the ridge and kept nearly the whole way along it till in 1 hr. they reached its lowest point, the *Col de Garin* (10,393'). On sheet 30 of the large Sardinian map this Col is erroneously laid down as connecting the Val d'Arbole with the head of the Val de Grauson. In point of fact, the E. side of the pass is occupied by a glacier forming the S. extremity of the *Val de Lore*, which joins the Val d'Aosta near *Brissogne*, $1\frac{1}{4}$ hr. E. of the city. Mr. Bonney is disposed to think that the summit of Mont Emilius might be reached from Aosta in less time by that way than by Comboë; but the height—very near 10,000 ft.—would make the expedition rather too much for a single day's walk, and the good night-quarters found at Comboë entitle that way to a preference. The Val de Lore, may, however, be well chosen for a return route from the Mont Emilius to Aosta. This valley, and the pass connecting the glacier at its head with the Val de Grauson, would form an interesting route from Aosta to Cogne, requiring 10 or 11 hrs. exclusive of halts.

To reach the pass to Grauson from the Col de Garin, the glacier above spoken of was crossed in 35 min. The *Pas de Lore*, found to be 10,049 ft. in height, overlooks a wild glen, a tributary of the Val de Grauson, the head of which lies farther E. Rough slopes lead down to the highest Alpine pastures, below which three beautiful little lakes intervene before reaching the first châteaux, 1 hr. 20 min. from the Col. Thence $1\frac{1}{2}$ hr. sufficed to descend into the valley, and to reach the village of Cogne, which lies a short way below the junction of the Val de Grauson with the main stream.

The grand view of the Grivola gained from the Col d'Arbole is missed in this route, but the views of the Grand Paradis and the Glaciers of Monei and Grancron, which remain in view during the descent from the Col de Lore, are scarcely less striking. The geologist will not

fail to remark the extensive traces of ancient glacier action visible throughout the descent.

ROUTE D.

COGNE TO BARD, BY THE FENÊTRE DE COGNE.

For those who have already visited Aosta, and who wish to approach the Italian valleys of Monte Rosa by a new route from Cogne, this will afford a pleasant variety. Though very rough, the path is passable for a mule or horse well used to similar expeditions. The way from Cogne to the châteaux of Chavanis is described in Rte. A. At that point the track to the Col della Nouva is left on the rt. hand, and a steep path mounts about due E. to a mere notch in the ridge which encloses the head of the valley. This is the pass of the *Fenêtre de Cogne* (about 8,860'), reached in $4\frac{1}{2}$ hrs. from Cogne, and the view from thence of the Grand Paradis is one of the finest in this part of the range. In the opposite direction the rugged summits of the ridge separating the Val Champorcher from the Val Soana are more striking than might be expected from their supposed moderate height. From the Col the path descends by soft and rather slippery soil to a dreary plateau watered by glacier streams where stands the Chapel of Notre Dame de la Neige. A short distance below the Chapel the path, after skirting the base of a high mountain on the rt. hand, overlooks the whole length of the *Val Champorcher* to Bard, and the traveller may also trace a path which crosses the ridge to the N. and descends through the Val de Fenis to the Val d'Aosta between Nus and Chambave. The scenery becomes more lively when the path reaches the pastures near a little lake at the N. foot of the Col di Reale (Rte. A), by which the Val Soana and the valley of the Orco may be reached from Bard. From this point, which is nearly 2 hrs. from the *Fenêtre*, about

4 hrs. are required for the descent to Bard, by an extremely rough and fatiguing path. The Val Champorcher is described in Mr. King's 'Italian Valleys of the Pennine Alps.'

Bard (Inn: Sole, poor and dirty) is described in § 20, Rte. I.

Another way from Cogne to the Val d'Aosta is by the *Col de Pontonet*, lying between the *Pointe de Tersiva* (11,053'), also called *Pointe de Dorère*, and the *Tour de Pontor*. The path leads from Chavanis to the head of the *Val de Fenis*, and thence to Chambave, about 3 m. from Chatillon (§ 20, Rte. B). The height of the pass is about 9,350 ft.

great glacier is proved by the characteristic rounded surfaces of rock, which may be traced to a height of 600 or 800 ft. along the retaining walls of the valley. [To the rt. is seen the opening of the *Val Piantonetto*, the upper part of which is called *Val Telleccio*; through it lies the way to the *Col de Telleccio*, between the *Pic d'Ondezana* to the E. and the *Tour de St. Pierre* to the W. The descent to Cogne lies over the *Glacier de Valeighia*.] At a poor little solitary inn, called *Val Pra*, refreshment and civility may be found by the passing traveller. Nearly 1 hr. farther is the wretched village of *Noasca*, whose miserable appearance recalls to mind the couplet—

Noasca, Noasea,
Poco pane, lunga tasca.

ROUTE E.

PONTE TO TIGNES, BY THE COL DE GALÈSE.

	Hrs.' walking	Eng. miles
Locana	2½	7½
Noasca	2½	7
Ceresole, mineral springs	2	6
Chapis	2	6
Col de Galèse	3	6
Laval	3½	8
Tignes	1½	3½
	16½	44

Carriage-road for about 3 m. beyond Locana—mule-path from thence to Chapis. The passage of the Col may sometimes take more time than above indicated; it should not be attempted except in fine weather, nor without a guide. The only good halting-place is at the mineral springs of Ceresole, about ½ hr. below the village of that name.

A good road, but dusty and hot for the pedestrian, leads from Ponte (Rte. A), through very fine scenery, to

Locana (Inns: Leone d'Oro, tolerable; Tre Pernici), a little old town with narrow streets. Above this place the scenery becomes wilder, but the prevailing tree is still the chestnut, which, with its rich foliage, contrasts finely with the nearer masses of rock, and the rugged peaks that form the background. The former passage of a

The *Noaschetta* torrent here descends from the N. through a wild glen leading to the Col de Grancrou, described in Rte. G, and immediately above the junction is one of the grandest scenes in the valley. In the midst of huge masses of granite the torrent, issuing from a rift in the mountain, forms a magnificent waterfall, close below which the path crosses the stream by a bridge formed of planks thrown from rock to rock. Above this is another fine waterfall, and the main valley bends to the S. of W., while two lateral glens mount towards the Grand Paradis, which is not seen from below. Keeping to the l. bank of the Orco, the mule-path mounts through the gorge, almost closed by huge masses of rock fallen from the precipices on either hand, and piled one on the other in Titanic confusion. Over the gap which marks the upper end of the gorge some snowy points of the Levanna are seen, and the path ascends more steeply by rude steps cut in the live rock—whence the passage is called *Scalare de Ceresole*—till at the summit it emerges abruptly into the upper level of the valley, a broad, almost level plain, divided into barley-fields and rich meadows, enclosed by pine forest, and above these by rugged

peaks, of which the chief is the Becca a Tre Corni—as the Levanna is called in this valley. To the left is the range over which lies the pass leading to the valley of Groscavallo, described in § 13, Rte. C.

About 2 m. above the Scalare is a tolerable inn, built near to a mineral spring, which attracts hither some summer visitors from Turin. It was not so well kept in 1862 as in preceding years, but offers, without comparison, the best head quarters for a mountaineer in this district, having, in addition to fair accommodation, the advantage of being 4,864 ft. above the sea. The house is, however, sometimes occupied by the king when hunting in this neighbourhood, in which case a traveller would be forced to resort to the wretched inn at the village of *Ceresole*, $1\frac{1}{2}$ m. farther up the valley. Very little is known of the range SW. of the Grand Paradis, separating the head of the Val Savaranche from Ceresole. The three highest summits are called *Cima di Charforon*, *La Cocagna*, and *Becca di Merlet*, between these it is probable that one or more passes may be found which would avoid the detour by the Col de la Croix de Nivolet (Rte. F). Above Ceresole the path continues along the l. bank of the Orco to the hamlet of *Chapis*, the highest in the valley, above which the comparatively frequented path to Val Savaranche turns off to the rt., while the little-used track to the Col de Galèse mounts due W., and the still more rarely traversed Col di Carro (§ 13, Rte. B) lies SW. To reach the Galèse the path mounts to the châteaux of Serue, where the scenery assumes the most savage and stern character, and the appearance of the pass is so forbidding that no one would think of attempting it if unaware that it had been already passed. The path seems to come to an end at the base of a gully—called the Petit Coluret—in the face of the mountain, and, instead of attempting to climb up it, keeps to the rt. along the face of a range of steep and rugged

rocks, overhanging a small lake. The ascent of these rocks is rather long and laborious, and 1 hr. from the châteaux is required to reach a small plain or shelf in the mountain, called Bellotta, often covered with snow, and partly occupied by a glacier which descends on the l. hand. An ascent of $\frac{3}{4}$ hr., partly over glacier, leads to the base of the Grand Coluret, a very steep couloir, partly filled with snow, whose condition varies with the season and the temperature. Under favourable circumstances it may be climbed in $\frac{1}{2}$ hr., but at other times it may be necessary to cut steps with the axe, which would consume at least $1\frac{1}{2}$ hr. The upper end of the Grand Coluret is close to the summit of the *Col de Galèse*, which is from 9,500 to 10,000 ft. in height, and commands a very fine view of the Tarentaise Alps. From 3 to 4 hrs. are required for the ascent from Chapis, but the descent on this side may usually be made in much less time, as the channel of the Petit Coluret is composed of yielding soil, so soft that it is almost impossible to ascend, but quite practicable in the descent. To descend the Grand Coluret when filled with hard-frozen snow, is an operation requiring the skill and steadiness of practised mountaineers; the pass should therefore not be undertaken without at least one good guide, nor without the indispensable aid of rope and ice-axe.

The Tarentaise side of the Col presents no difficulty. A smooth and nearly level glacier is crossed for about 20 min. in a direction rather N. of W., and after reaching the highest Alpine pastures, a sheep-track is found leading down a glen, which ultimately joins the mule-path of the Col d'Iséran at Fornet, about 2 m. above Laval, whence descending, Tignes (§ 11, Rte. B) may be reached in 1 hr., or in all 4 hrs. from the summit, but for the ascent from Tignes from $5\frac{1}{2}$ to 6 hrs. are required.

ROUTE F.

CERESOLE TO VILLENEUVE, IN VAL
D'AOSTA—ASCENT OF THE GRAND
PARADIS.

	Hrs.' walking	Eng. miles
Chapis	2	6
Col de la Croix de Nivolet	2½	6
Pont	2½	6½
Valsavaranche	2	6
Villeneuve	3½	9½
	<hr/> 12½	<hr/> 34

This path is practicable for mules. The distance is taken from the inn near the mineral spring, and not from the village of Ceresole.

As mentioned in the last Rte., the track to the Val Savaranche turns to the rt. near the hamlet of Chapis. It mounts rather steeply by the l. bank of a torrent, and in about 1¾ hr. reaches a little plain, a shelf on the steep side of the mountain, commanding a very grand view of the head of the valley of the Orco and of the Col de Galèse. From this point the way to the summit is by a rugged buttress of rock, where no one would expect to find a passage, and this leads directly to the summit of the *Col de la Croix de Nivolet*. Although the lowest pass in the entire of this district, this is 8,624 ft. in height, and fresh snow is generally found in patches near the top. The ridge which is now traversed, and which separates the head of the Val Savaranche from that of the Val Locana, is of unusual breadth, the upper level forming a slightly inclined plateau of from 5 to 6 miles in length. A short distance below the summit, the striking peak of the Grivola comes into view, and contrasts finely with the dreary character of the upland plain, patched with snow fields and small lakes, across which the path lies. About half-way across the plateau, near to the largest of these lakes, is the *Châlet de Nivolet*, where, during the height of summer, herdsmen are found who willingly afford hospitality. They have spoken of building a separate hut,

with two beds, for the accommodation of strangers, but the editor has not learned that this project has become a reality.

The position would be convenient for exploring the neighbouring ranges. Travellers coming from the Val d'Aosta who may wish to combine this pass with the Col de Galèse, should be aware that from near the summit a rough path leads to the rt. from the main track, by following which the châteaux of Serue near the base of the Little Coluret may be reached in 2 hrs. from the Châlet de Nivolet.

Of the *Col de Rosset*, leading from the lakes to the head of the Val de Rhêmes, the editor has received no information.

Beyond the châteaux the plateau is traversed by a rocky ridge which has been flattened and rounded by the former passage of a glacier. A large number of erratic blocks have been deposited on these smooth surfaces by the extinct glacier. Some of these are so nicely poised that a slight exertion would upset them, but it may be hoped that no traveller will be so stupidly barbarous as to cancel these records of the past history of the earth.

After about 1¾ hr. from the summit the path reaches the NE. end of the plateau, marked by a cross called Croix d'Aroletta (7,451'), at the verge of a steep descent leading to *Pont*, the highest hamlet in the Val Savaranche. The view of the near mass of the Grand Paradis with its attendant peaks, and the range extending thence to the Grivola, is celebrated by all who have passed this way as one of the finest in the Alps. 'A rough but well-engineered path zigzags down the cliff like an expurgated edition of the *Gemmi* with the objectionable parts omitted.' —[F. F. T.] The descent, as well as the whole upper portion of the valley, abounds with the evidence of glacial action on the grandest scale. After the bare and somewhat dreary aspect of the upper part of the Val Savaranche the traveller is well pleased to re-enter the region of pine forest which clothes the

slopes below Pont, while the peaks and aiguilles which tower above them entitle this to rank among the grandest of Alpine valleys. At Bien (5,263'), a hamlet about 1 m. above the chief village, Mr. Tuckett was hospitably received at the house of Jean Pierre Jocale, but a little inn (H. de Nivolet) has since been opened at

Valsavaranche, also called *Gioux*, the chief village of the valley, 4,950 ft. above the sea. The inn, not that consigned to notoriety by Mr. Ormsby under the name Marmots' Hole, is kept by Victor Blanc. It supplies at least one good bed and very tolerable fare, and the landlord is declared to be 'an excellent old fellow.'

The natives of the Val Savaranche appear to be generally honest and hospitable to strangers, who, perhaps because of the fewness of their number, have carried away a very favourable impression of the population. Ambrose Dayné and J. M. Chabot, two *gardes-chasse* who live at Val Savaranche, have acted as guides to Mr. Tuckett and Mr. Ormsby in the two difficult expeditions against the Grivola narrated in the second series of 'Peaks, Passes, and Glaciers.' Both of them, especially Dayné, are good cragsmen, but, like most of the Piedmontese hunters, they are very inferior as ice-men to the experienced guides of Chamouni or the Bernese Oberland.

[There is a pass from hence to Notre Dame de Rhêmes (§ 15, Rte. D) which is said to be easy and practicable for mules; and another, more interesting but more difficult, to Cogne by the *Col de Lauzon* (see Rte. A). Information is desired respecting both of them. The path for Cogne mounts in about $1\frac{1}{2}$ hr. to the *Châlet de Livionaz* (7,600'), and $\frac{1}{2}$ hr. farther reaches another solitary chalet, whence the way does not appear to present any serious difficulty.]

Below the village of Valsavaranche the path to Villeneuve keeps for about $2\frac{1}{2}$ m. to the rt. bank, then crosses the stream, and returns in $\frac{1}{2}$ hr. farther to the same side, for the most part at a great height

above the ravine through which the torrent rushes down. On approaching the point where the stream from the Val de Rhêmes bending to the NE. joins that of Savaranche, and both together are mingled with the Dora Baltea at Villeneuve, the traveller finds himself at a great height above the Val d'Aosta, overlooking that valley and the lower end of the Val de Rhêmes, richly wooded and set with orchards and cornfields, with the range of Mont Blanc in the background. The paved mule-path by which lies the descent to Villeneuve is laborious and trying to the feet, both in ascending and descending the valley.

Villeneuve (§ 15, Rte. A) has a bad reputation among travellers for the absence of decent accommodation, civility, or even the convenience of a vehicle by which to escape from its inhospitable precincts, and it is best to time the day's journey so as to reach Aosta, 7 m. farther, on the same evening.

Ascent of the Grand Paradis. This, the highest summit of the Graian Alps, was first attained in Sept. 1860 by Messrs. J. J. Cowell and W. Dundas, both members of the Alpine Club, with Michel Payot of Chamouni, and Jean Tairraz, of the hotel at Aosta, as guides. The first ascent having been made during very unfavourable weather, and not without serious risk to the whole party, Mr. Cowell returned to the summit with Payot on the following day, and by this spirited proceeding enabled himself to complete the interesting account of the mountain which he has published in the second series of 'Peaks, Passes, and Glaciers.' The close agreement between a boiling-point observation by Mr. Tuckett, and a theodolite observation from the Grivola, by Mr. Mathews, enables us to fix the height with great probability at 13,300 ft.

From the hamlet of Pont, at the head of the Val Savaranche, a glen mounts to the SE. towards the *Châlet de Mont Corvé*, where it is possible to pass the night previous to attempting the ascent.

Two paths lead thither from Pont. One, a mule-path, winds round the steep slopes, and requires $1\frac{1}{2}$ hr. for the ascent. The foot-path, which lies to the l. of the other, mounts rapidly in 1 hr. to the chalet (about 8,200'), which is inhabited only till the middle of September. Milk and *polenta*, with hay to sleep upon, is all that the traveller can expect to find. Covering for the night may be borrowed at Valsava-ranche.

The peak of the Grand Paradis lies to the E., and from its base three glaciers are seen to radiate—the *Glacier de Montandéni*, flowing towards the N. and then NW.; the *Glacier de Mont Corvé*, descending due W.; and between the two the much smaller *Glacier de Lausqueour*, which does not descend into the valley. As far as it is possible to identify the actual condition of things with a map not founded on a survey, it would appear that the authors of the large Ordnance Map of Piedmont have intended to represent the Paradis by the name Becca di Montandeni, not known in the valley, but apparently given by them to the peak seen above the glacier bearing that name. From the chalet the base of the Gl. de Lausqueour was reached by Mr. Cowell in 1 hr., and it was then necessary to climb the rocky barrier extending thence to the Gl. de Mont Corvé, till after another hour a nearly level plateau of snow was reached which is bounded to the rt. by precipices overlooking the last-named glacier. The snow-slope, gradually increasing in steepness, forms a ridge bordering the precipices, and along this ridge, the snow being hard, it was necessary to cut steps for 2 hrs., and when this had been surmounted the topmost peak, or rather crest, of the mountain came fully into view. It is somewhat in the form of the roof of a gothic church, rising slightly towards the NW. end, which is the highest summit. From the point which they had reached, the travellers were cut off from the topmost ridge by a broad trench or corridor, which is in fact the head of the

Glacier of Montandéni. The NW. and higher end of the ridge rises so steeply from the corridor as to be quite inaccessible, and it was necessary to make a circuit towards the upper end of the corridor, and then mount diagonally along slopes of extreme steepness, varying from 45° to over 50° , and traversed by a crevasse or bergschrund which at the time was about 3 ft. in breadth. In $2\frac{1}{4}$ hrs. this was accomplished, and they reached the final crest of the mountain, an excessively sharp cornice of frozen snow, from which a few pinnacles and turrets of shattered mica slate project. There is not anywhere a square foot of level surface, except at the top of a crumbling turret, and it was necessary to hold on by one hand to the rock while taking observations and otherwise engaged. The panorama, as is evident from the position of the peak, is one of the most extensive and complete to be found in the Alps. In the descent, the way may be shortened and made easy by glissading over the snow-slopes when these are in proper order.

If one who has not ascended this mountain may differ from the explorer to whom we owe our first acquaintance with it, the writer will express the decided opinion that no 'lady,' or 'inexperienced climber,' should be induced by Mr. Cowell's encouraging remarks to attempt the ascent, especially when the snow is in the condition in which he found it. It is, however, right to say, that Mr. Tuckett, making the ascent much earlier in the season, with the snow in good order, and keeping to the rt., or farther S. than Mr. Cowell, avoided most of the difficulties above described, and had scarcely a single step to cut. He reached the summit in 3 hrs. from the point where he set foot on the Glacier de Mont Corvé, and descended from the top to Ponte in $2\frac{1}{2}$ hrs.

ROUTE G.

COGNE TO CERESOLE—COL DE GRANCROU.

(10 to 11 hours.)

A very fine pass, first effected on the 28th June, 1862, by Mr. F. F. Tuckett, with Michel Croz of Chamouni and Peter Perrin of Zermatt. They ascended from Cogne through the Valnontey to the chalets of Vermiana, and in $\frac{3}{4}$ hr. from thence reached the foot of the Glacier de Grancrou; $4\frac{1}{2}$ hrs. were employed in ascending through the *séracs* of the glacier to the snow-ridge connecting the Grand Paradis with the Rossa Viva. Mr. Tuckett thinks that under favourable circumstances the ascent may be made in half that time, and recommends future travellers to aim at a point in the ridge a little to the l. or E. of its lowest point. In the ascent the remains of a bouquetin, which had some time before been destroyed by an avalanche, were found on the glacier. The summit of the col was found by a barometrical measurement to be 11,034 ft. in height. The Grivola and Paradis are concealed by intervening ridges, but the Pennine chain from the Vêlan to Monte Rosa on the N., and in the opposite direction the Levanna, with a host of more distant summits, compensate for their absence.

On quitting the col we descended a couloir without difficulty, and traversed the gently inclined névé of a small glacier till we came in sight of a lake on the rt., after passing which we commenced descending. In a few minutes we reached a small moraine, and soon found farther progress in this direction barred by a precipice, to avoid which it was necessary to keep well away to the rt. till we reached the lateral moraine of a glacier at the head of which a portion of the S. extremity of the Grand Paradis came in view. We descended this moraine to the point where that of the l. hand glacier from our col united

with it, traversed an upland plain resembling an old lake-bed, and keeping along its rt. side, struck a path which led first over a low shoulder, and then down into a second plain. Into the upper portion of this basin a glacier comes down (from the Cocagna?), and though it appeared much crevassed, we thought it probable that a passage might be effected in this direction into the Val Savaranche. The path, now of considerable size, probably one of those constructed at the king's expense for hunting purposes, again traverses a shoulder and descends by a series of zig-zags through magnificent rock scenery to the Alp of Noaschetta. Thence it bears away, occasionally mounting slightly, round the slopes to the rt., traverses the hamlet of La Varda, and then descends by a considerable detour to the level of the Val d'Orco, a little below the Scalare di Ceresole.'—[F. F. T.]

The glacier scenery on the Cogne side, and the rock scenery on the S. side of the col, are of the highest order. Time : Cogne to foot of glacier, 2 hrs. Ascent of glacier to the col, $4\frac{1}{2}$ hrs. Descent to Alp of Noaschetta, $2\frac{1}{2}$ hrs. La Varda, 1 hr. Ceresole, $1\frac{1}{2}$ hr. Total, $11\frac{1}{2}$ hrs. But with the glacier in good order, 10 hrs. would probably suffice.

The SE. angle of the Valnontey is occupied by the great *Glacier de Monei*, originating in an extensive basin between the Rossa Viva and the Tour de St. Pierre. It is probable that a pass direct from Cogne to Locana may be found across the ridge connecting those peaks.

SECTION 15.

RUITOR DISTRICT.

FROM the dividing range of the Graian Alps, forming the frontier between Piedmont and Savoy, two valleys descend to the NNE., parallel to the Val Savaranche. The most easterly of

these—the *Val de Rhêmes*—turning a little to the rt. at its lower end, joins the *Val Savaranche* just before their united streams are poured into the *Dora Baltea* at *Villeneuve*. The *Val Grisanche*, lying W. of the *Val de Rhêmes*, is also bent aside from its direct course as it approaches the *Val d'Aosta*, and its junction with that valley at *Arvier* is only a short distance W. of *Villeneuve*. The W. slope of the dividing range is formed by the valley of the *Upper Isère*, described in § 11, which flows from SSE. to NNW., and it thus follows that the mass of mountain lying between the *Isère* and the *Grisanche* spreads out to the N. in the form of the letter V. The space between these valleys is mainly occupied by a great glacier-clad mass which, by comparison with the peaked forms of the neighbouring Alps, may be called a plateau. The nomenclature of the projecting eminences and buttresses of this mass is very unsettled, there being scarcely any points sufficiently marked to be seen and recognised from several different sides; but the tract of glacier which covers the plateau is conspicuous from every eminence in the surrounding valleys, and is known by the name *Glacier du Rutor*. To Mr. W. Mathews we are indebted for the thorough exploration of this little-known mass, and we shall follow his example in calling the two highest points—both of which were reached, apparently for the first time, by that indefatigable mountaineer—the S. and N. peaks of the *Rutor*. Their height—S. peak (11,480), and N. peak (11,339)—falls considerably short of that of the summits lying farther south; the *Aiguille de la Sassiére*, at the head of the *Val Grisanche*, being 12,343 ft., and the *Grand Appareil*, at the upper end of the *Val de Rhêmes*, nearly 12,000 ft. in height. The N. limit of this district is naturally formed by the pass of the *Little St. Bernard* (7,218'), the lowest in the chain of the Alps between the *Mont Cenis* and the *Simplon*. At the village of *La Thuile*,

or at the *Hospice* on that pass, a traveller may find tolerable quarters; but one who would explore the upper portions of the valleys of *Rhêmes* and *Grisanche* must not expect anything beyond châlet fare and accommodation.

ROUTE A.

BOURG ST. MAURICE TO AOSTA—PASS OF THE LITTLE ST. BERNARD.

	Hrs.' walking	Eng. miles
St. Germain . . .	1 $\frac{1}{2}$	5 $\frac{1}{2}$
Hospice . . .	1 $\frac{1}{2}$	5
Cantine . . .	1 $\frac{1}{2}$	3 $\frac{1}{2}$
La Thuile . . .	1 $\frac{1}{2}$	4 $\frac{1}{4}$
Pré St. Didier . .	1 $\frac{1}{2}$	5
Morgex . . .	1 $\frac{1}{2}$	4
Arvier . . .	2 $\frac{1}{2}$	8 $\frac{1}{2}$
Villeneuve . . .	1	3 $\frac{1}{2}$
Aosta . . .	2	7
	14 $\frac{3}{4}$	46

A very rough road, practicable for a light char, or country cart, traverses the pass from *Bourg St. Maurice* to *St. Didier*. A new road has long been in progress; it is nearly completed on the *Savoy* side, but the portion between *La Thuile* and the *Hospice* is not yet commenced. A carriage-road, pretty well kept, leads from *St. Didier* to *Aosta*. Between these two places there is no inn at which a traveller would willingly stop. The charge for mules at *Bourg St. Maurice* is 8 fr. to the *Hospice*, and 15 fr. to *St. Didier* or *Courmayeur*.

The pass of the *Little St. Bernard* is not only one of the lowest, but also one of the easiest in the Alps, and if its commercial importance had been greater, it would probably long since have been traversed by a high road. Many writers have believed this to be the pass by which *Hannibal* entered *Italy*, and in some particulars it agrees well with the details handed down by *Polybius*. See § 7, Rte. C.

At the village of *Scez*, 2 m. above *Bourg St. Maurice* (§ 11, Rte. A), the *Récluse* torrent, descending from the NE., seems the natural prolongation of

the valley of the Isère, while the main stream flowing from Tignes makes a sharp angle on entering the valley through which it reaches Moutiers. The mule-path is carried for some distance along the l. bank of the Récluse, and after passing the hamlet of Villard Dessous, crosses the stream near to an escarpment formed of gypsum, called the Roche Blanche, which has been identified with the *λευκόπετρον ὄχυρόν* of Polybius. The new road is carried in long zigzags above the l. bank, and re-joins the mule-path near to the Hospice. The highest hamlet, reached by a rapid ascent of 2 m. from the bridge, is *St. Germain*, where there is a wretched inn. The way then continues to mount by gentle slopes quite bare of trees, and the scenery might be called tame but for the fine peak of the Mont Pourri, a very striking object to those who descend on the side of Savoy. About two-thirds of the way from *St. Germain* to the Hospice are some châteaux, at one of which refreshments may be obtained; but these are not quite 2 m. distant from the *Hospice* (7,123'). This stands at the SW. end of a grassy plain, nearly 3 m. long and 1 m. wide, about 300 ft. below the actual col, which lies at the middle of the plateau, sloping very gently on either side. A part of the building is under the management of ecclesiastics, who receive and lodge poor travellers; the other portion is an inn, fairly kept, for the benefit of those who can afford to pay. The plateau contains several remains of antiquity, whose origin is involved in obscurity. Close to the summit is a column of Cipollino marble, about 20 ft. high and 3 ft. in diameter, called *Colonne de Joux*, and supposed to be of Celtic origin (?), and near at hand a circle of stones of moderate size, laid flat on the ground, bears the name *Cirque d'Hannibal*. There is nothing to show whether the name represents a popular tradition, or the conjecture of some learned monk in the neighbouring hospice, or that of some more modern antiquary. A traveller

who makes his head-quarters for a day or two at the Hospice, may find some new country to explore on either side of the pass. The peaks of the *Vallaisan* and the *Belvedere*, both outliers of the Ruitor group, lie on the SE. side. The latter, said to be more difficult, commands the finer view. In the opposite direction lies the *Belleface*, and there would probably be no great difficulty in finding a passage across a small glacier E. of that peak, and so reaching from this side the head of the *Allée Blanche*, somewhere near to the *Col de la Seigne*. A traveller bound for *Ste. Foi* or *Tignes* (§ 11, *Rte. B*) may shorten the way by 2 hrs. by ascending from the Hospice to the ridge of the *Traversette*, and then winding round the steep slopes, whose drainage is borne to the Isère between *Sainte Foi* and *Scez*. The path being scarcely traced, it is advisable to take a local guide.

The descent towards the *Val d'Aosta* commences nearly due N.; a small lake is passed on the l. which receives the drainage of the glaciers E. of the *Belleface*. At several points on the way the range of *Mont Blanc* is seen towering above the nearer heights. In about 1 hr., descending, the *Cantine des Eaux Rousses* is passed, and the track generally approaches nearer to the *Thuile* torrent, until, at *Pont Serrant*, it crosses from the rt. to the l. bank by a bridge thrown over a deep ravine. The descent continues to NE., and is rather steep as far as the village of *La Thuile* (*Inn: La Croix Blanche*, bad), about 4,700 ft. above the sea, where a glen opens to the S. leading directly to the great Ruitor glacier (*Rte. B*). A pedestrian bound for *Aosta* may avoid the beaten track, and gain some fine views of *Mont Blanc*, by taking a local guide to the *Camp du Prince Thomas*, still marked by the remains of entrenchments on the heights E. of *La Thuile*. A steep descent leads thence down to the banks of the *Dora*, nearly opposite to *Morgex*. The road from *La Thuile* to *St. Didier*

formerly lay on the l. bank, much exposed to avalanches from the Cramont. To avoid this danger, the present road was carried along the rt. bank, at a great height above the torrent, for a distance of nearly 2 m., returning to the l. bank at *La Balme*. The descent through a pine forest overhanging the ravine of the Thuile is picturesque, and some fine peeps at the range of Mont Blanc are gained before reaching

St. Didier, properly called *Pré St. Didier* (Inns: Poste, not good, dear; Pavillon). Close to the village are the baths, very picturesquely situated, and frequented during the summer. The view of Mont Blanc, and the fine timber that covers the adjoining slopes, make the scenery here far superior to that of the immediate neighbourhood of Courmayeur, but the accommodation is inferior, and, with the sole exception of the Cramont, this place is more distant from all the objects of interest on the S. side of Mont Blanc. See § 16, Rte. B.

Close to St. Didier the road crosses the Dora Baltea above its junction with the Thuile, and makes a short ascent to join the main road, leading from Courmayeur to Aosta, along the l. bank of the stream. From hence to Courmayeur the ascent is steep, and fit only for light carriages, while the descent to Aosta is easy, and the road usually in good order. The first considerable village is *Morgex* (Inn: Lion d'Or), where the path to the Great St. Bernard by the Col de la Seréna turns off to the NE. The vine begins to appear here, and becomes more common a little lower down, about *La Salle*, a poor village, below a ruined castle, which is supposed to preserve the name of the *Salassi*, who once held the valley. The valley gradually contracts below La Salle, as it approaches a fine modern bridge thrown across the Dora, close to the junction of a torrent from the Combe de Vertosan, opening due N., and leading by the Col de Vertosan to St. Remy (§ 18, Rte. A). Below the bridge the valley

becomes a mere defile, and the road is carried along the rt. bank at a great height above the stream, in some places forming a projecting cornice, propped up by massive beams of timber. The pass was formerly guarded by a gate and drawbridges; these have now disappeared, along with a blockhouse intended to enfilade the road, but it would be easy to make the valley impassable to a hostile force, by destroying the props which sustain the road. On issuing from the narrowest part of the defile, the picturesque village of *Avise* is seen on the opposite bank, and approaching the opening of the Val Grisanche (Rte. C), the new road makes a sweep to the rt. to avoid the wretched village of *Ivrogne* (Inn: L'Écu, tolerable). Here lives Charles Alexis Luboz, who accompanied Mr. W. Mathews as porter, at 5 fr. a day, in his first exploration of the glaciers of the Rutor, and of whom a very favourable report is given by that gentleman. Here, and throughout the Val d'Aosta, it is painful to contrast the beauty of the scenery, and the richness of the vegetation, with the poverty, filth, and cretinism which are the characteristics of the population. Between a fine avenue of walnut trees the road reaches *Arvier*, opposite a steep and lofty escarpment above which, on the N. side of the valley, is seen the spire of the church of St. Nicholas. To the rt. is the opening of the beautiful valleys of Rhêmes and Savaranche, which unite their torrents close to *Villeneuve*, a large dirty village where neither decent accommodation nor a vehicle is to be found. However tired, a traveller will do wisely to push on to Aosta. The road here returns to the l. bank of the Dora, and in 1½ m. reaches *St. Pierre*, with an ancient castle commanding a view of the snowy Alps at the head of the Val Savaranche. A little farther is the opening of the Val de Cogne, with the peak of the Grivola towering above it. Several modernised *châteaux* are seen on either slope of the valley, and the character of the vegetation

announces a marked change of climate as the valley widens out, and the road, here hot and dusty, reaches

Aosta (Inns: H. du Mont Blanc, good, kept by Jean Tairraz of Chamouni; Couronne, 'in new hands, newly fitted up, may probably deserve a trial' [M.]; Écu du Valais, pretty good; H. d'Italie, tolerable), a small city, the capital of the ancient Duché d'Aoste, interesting to the stranger from its fine position, and still more from its venerable antiquity, carried by the local historians up to more than eleven centuries before the foundation of *Augusta Prætoria*, which happened a few years after the destruction of the earlier city of the Salassi by the legions of Augustus. Few places in Europe have so well preserved the plan and general character of the Roman city. The ramparts, forming a perfectly regular rectangle, are still in good preservation, especially on the S. side, where they are most easily approached. The E. gate, formerly *Porta Prætoria*, is also tolerably well preserved, though wilfully damaged during the middle ages, and at a short distance on the road which formed the main approach to the city is a triumphal arch, erected in honour of Augustus by Terentius Varro; and near to it, at some distance beyond the actual course of the stream, is a Roman bridge, which formerly crossed the Buttier, but is now partly buried in the soil that has accumulated over its ancient bed. The remains of an amphitheatre, and several other buildings whose destination is a subject of controversy, will furnish occupation to the antiquary. The *cathedral*, externally of little interest, is of high antiquity. Some parts of the building, two Roman mosaics preserved near the high altar, and some curious objects exhibited by the Sacristan, date from the 5th century. The church of *St. Ours*, with its ancient crypt, and a cloister whose columns sustain very curious carved capitals, is well worth a visit. X. de Maistre's touching tale may induce some travellers to visit the Tour du Lépreux at

the W. end of the town, not far from the Hôtel du Mont Blanc.

The Chanoine Carrel, who is a member of the Chapter of Aosta, and inhabits the city, and who is well known for his valuable contributions to the meteorology of the Alps, receives very kindly any travellers engaged in these or similar pursuits who may apply to him for advice and information. His observations, which have been carefully conducted for many years, are important to those who seek to determine by barometric observations altitudes of peaks, &c., in this part of the chain of the Alps. The height of his observatory by the mean of his observations is exactly 600 metres, or 1,969 English ft.

ROUTE B.

LA THUILE TO SAINTE FOI—ASCENT OF THE RUITOR.

The entire drainage of the N. side of the Ruitor is carried down through a torrent of the same name to join the Thuile, near the village of La Thuile (Rte. A). From the beautiful Alpine glen of the Ruitor two glacier passes lead to the valley of the Isère, near to Sainte Foi (§ 11, Rte. B). Of the more westerly of these, called on the Piedmontese map *Col du Grand Glacier*, the editor has received no information. The second pass, nearly due S. of La Thuile, is scarcely more known. It is called *Col de Tacqui*, and also *Col de la Lys Blanche*, and is said to lie between the *Pointe Rousse* and the *Grand Assaly*, two of the summits of the Ruitor group, the latter of which is seen from La Thuile. According to Joanne, perhaps on the authority of some local guide, the ascent from Ste. Foi to the pass requires 5 hrs.

Mr. W. Mathews, to whom we are indebted for so much of what we know of the adjoining group of the Tarentaise Alps, is entitled to the credit of having been the chief explorer of the considerable mountain mass which goes under

the collective name Ruitor. By an expedition made in 1861, in company with Mr. Jacomb, which is described in the second series of 'Peaks, Passes, and Glaciers,' and by a second exploration along with the Rev. T. G. Bonney in 1862, the notes of which have been kindly communicated to the editor, he proved the possibility of taking the highest summit of the Ruitor in the way from La Thuile to Sainte Foi, or of descending from thence to Planaval, in the Val Grisanche. The descent to Ste. Foi is, however, a matter of some difficulty, and should be attempted only by practised mountaineers with first-rate guides.

On leaving La Thuile, Messrs. Matthews and Bonney crossed the stream from the Little St. Bernard, and followed a tolerably level path along the l. bank of the Ruitor torrent. 'One hr. from La Thuile are the châteaux of La Joux, at the foot of the steep and lofty barrier of rock which closes the head of the valley. This barrier is covered with pines, and crowned by the extremity of the great Ruitor glacier, which discharges a torrent that leaps down the rocks in a series of beautiful cascades. The path from La Joux to the highest châteaux crosses the stream three times, and is by no means easy to find. On leaving La Joux we crossed by a foot-bridge, which stands a few yards below the châteaux. The path then ascends amidst charming scenery, winding round steep faces of rock and among gigantic boulders, clothed with larch and the cembra pine, mingled with a few spruces. Close at hand the torrent thunders down a deep cleft, and 10 min. above La Joux forms a noble cascade, which is well seen from an opening in the forest a few paces from the path. In another $\frac{1}{2}$ hr. we returned to the l. bank, just above the junction of a tributary stream from the W. Above this the zigzags became steeper, and in $\frac{1}{2}$ hr. more we emerged from the pines, and saw before us a beautiful mountain lake embosomed in an amphitheatre of rock. Down the face of the opposite rocks the

main torrent rushed into the lake, which is also fed by a smaller stream on the rt. coming from the direction of the Col de la Lys Blanche. On the l. is a châteaux, with a small Alp, divided from us by the torrent just below its exit from the lake. Crossing the stream for the third time, we found the châteaux deserted, the establishment having probably been moved up to the higher châteaux. There are few walks in the Alps so beautiful as that from La Joux to this spot.'—[W. M.]

The distant view comprises a great portion of the range of Mont Blanc. The highest châteaux—those of *Ste. Marguérite*—were reached in $\frac{3}{4}$ hr.'s steep ascent by the slopes behind the lower châteaux. They stand close to the great glacier, and required 3 hrs. 40 min., fast walking, from La Thuile. The wooden shed which serves as a sleeping apartment did not appear tempting.

'The Alp of Ste. Marguérite is one of the most enchanting spots in the Graian chain. A few yards distant is an exquisite glacier lake, fed by the water issuing from a cavern in the blue ice cliffs which enclose it, while many miniature icebergs float upon its surface, forming a scene which would scarcely suffer by comparison with the celebrated Märgelen See. Above the lake extends the great ice-fall of the Ruitor glacier, flanked on either side by two rocky peaks, which form, as it were, the gates of the glacier, and midway between them the horizon line is broken by a sharp pyramid of rock (Grand Assaly?), crowned by a stone man.'—[W. M.]

From Ste. Marguérite the Col de Tacqui lies about SW., and in the opposite direction it is possible to reach the Val d'Aosta by the *Col de Ste. Marguérite*, descending upon Derby, about 5 min. above Ivrogne.

'Throughout the ascent from La Thuile the marks of glacial action are conspicuous, and just before reaching Ste. Marguérite we passed a dome of rock with a fine *bloc perché* on the summit.

'After a short halt at the châteaux, we took to the ice near a small lake above

the principal one, and directed our steps towards the central part of the glacier, which is of enormous size. It is bounded rt. and l. by a double row of peaks.'—[W.M.] On the l. or E. side these are six in number. No. 1, the eastern gate, is a long ridge of dark rock, beyond which is a col which would lead to the glacier descending towards Planaval, in the Val Grisanche (Rte. C). Nos. 2 and 3 are low snow-peaks, scarcely more than prominences in the ridge. No. 4 is the double-headed peak, apparently the highest when seen from Aosta, which was ascended by Mr. Mathews in 1861. No. 5 is rather lower than this, but No. 6, seen on the extreme l. from Aosta, is the highest summit of the entire group, and the most distant from the foot of the glacier. On the W. side of the glacier, besides the two peaks already mentioned—that which forms the western gate (Pointe Rousse?), and the more distant summit, which is probably the Grand Assaly—there is a third peak, a snow pyramid still more remote from La Thuile, standing opposite to the highest summit.

'After passing in succession the first five summits on the E. side of the glacier, we made straight for the ridge between No. 5 and No. 6, and followed the crest to the base of the final peak, a steep tower of rock, about 18 ft. high. This, the only difficulty of the excursion, was found by no means easy to climb, but with Michel Croz's assistance we reached the top of it.'—[W.M.]

About 3½ hrs. were required for the ascent from Ste. Marguerite. *Saxifraga bryoides* and an *androsace* (*glacialis*?) were found abundantly on the top.

Mr. Mathews has justly compared the position of the Ruitor in respect to the range of Mont Blanc to that of the Buët, both being separated from it by a lower intermediate range. There is, however, this difference—that on the opposite side to Mont Blanc the Ruitor is encircled by the loftier peaks of the Graian and Tarentaise Alps; and the only direction in which the eye pene-

trates to the lower cultivated region is along the Val d'Aosta, which is viewed throughout the entire distance from Ivrogne to beyond Chatillon—a distance of fully 25 m. The head of the Val Grisanche, closed by a great glacier, which appears to fill the space between the Grand Apparei and the Sassièrè, is one of the most interesting portions of the panorama.

In 1862 Messrs. Mathews and Bonney returned to La Thuile, and found an easier passage by keeping nearer to the rt. side of the glacier. The descent, hurried by a passing storm, was effected in 4 hrs., including two short halts.

In 1861, Mr. Mathews and Mr. Jacomb, having slept at a châlet 2 hrs. above Planaval, in the Val Grisanche (Rte. C), reached the summit called No. 4 in the preceding description by an easy ascent of 3¾ hrs., over a glacier which descends on the E. side of the ridge. Thence, by a slight circuit, they descended to the col between No. 4 and No. 5, on which they found a little glacier lake, perhaps due to the great heat of that season. They expected to pass from the head of the Ruitor Glacier due S., so as to gain the track of the Col du Lac (Rte. C). The descent on that side was found to be impracticable, and they therefore made a circuit to the W. round the head of the glacier, until, immediately S. of the peak which has been spoken of as probably the Grand Assaly, they found an opening to the W., where fearfully steep snow-slopes overlook a more level glacier, terminating in Alpine pastures. The descent was found to be difficult, even to such experienced ice-men, and it was necessary to use the axe for a considerable time. At length they reached some beautifully-situated châlets, called La Sassièrè de Ste. Foi. The descent to the village of the same name (§ 11, Rte. B), about 2 hrs., is described as extremely beautiful, the noble peak of the Mont Pourri lying constantly in view.

From the barometric observations of

Messrs. Bonney and Mathews, the height of the S. or highest peak of the Ruitor appears to be 11,480 ft., and that of the second or more northern peak 11,339 ft.

Both these travellers believe that there would be no difficulty in descending from the highest summit of the Ruitor direct to the Val Grisanche, so that a traveller starting from La Thuile or Ste. Marguérite may on the same day reach Ivrogne. They have also pointed out that, by combining the Col de Tacqui with the Col de Ste. Marguérite, it would be easy to reach Derby and Ivrogne from Ste. Foi in one rather long, but very interesting, day's walk.

ROUTE C.

IVROGNE TO SAINTE FOI, BY THE VAL GRISANCHE.

The *Val Grisanche* forms the E. limit of the mass of the Ruitor. Being inclined at an acute angle to the direction of the upper valley of the Isère, a person bound for the latter destination will shorten his rte. by mounting near to the head of the valley where it approaches nearest to the Isère. The lower part is richly wooded and picturesque, while the upper end presents one of the wildest and dreariest scenes in the Alps. It is also one of the most completely enclosed of Alpine valleys. There are, indeed, four passes known to the native chamois hunters, which give access to the Val de Rhêmes. They all approach 10,000 ft. in height, and no particulars have been obtained respecting any of them. That nearest the head of the valley is called *Col de Bas-sac*. No pass is known to exist across the great glacier which lies at the head of the valley, E. of the Aiguille de la Sassièrè, but Mr. Mathews, who has seen it on both sides, is convinced that a fine pass may be made in that direction to the summit

of the Col de Gailletta (Rte. D), and so to Tignes. On the W. side three passes lead into the Val de Tignes. Immediately S. of the Ruitor is the Col du Lac; farther S., between the Ruitor and the Ormelune, is the Col du Mont. The Ormelune (10,833) is the chief summit in the range connecting the Ruitor with the Sassièrè, and between it and the latter peak is a third little-frequented pass, called Col du Clou, and also Col de Vaudet.

1. *By the Col du Lac*. About 9½ hrs.

Near to its junction with the Dora Baltea, the torrent which drains the Val Grisanche flows through an impassable ravine, and to enter the valley it is necessary to commence the ascent immediately behind the village of Ivrogne, passing a mill, and mounting amidst meadows and orchards that appear to lead away from the Grisanche.

After passing these the path arrives abruptly below some rocks; thence, turning and ascending along their bases, the traveller shortly finds himself in the track which is carried high above the l. bank of the Grisanche.

The scenery here is of a striking character. The river roars so deep in the gorge as scarcely to be heard; and the rocks which bound its course are so nearly perpendicular, that the tops of lofty and enormous pines, rooted in the rifts below, can almost be touched by the hand of the traveller in passing above them. Overhanging the path, the mountains so close in, that the light of day does not half illuminate this deep and savage defile. On a sort of terrace, on the opposite bank, the ruins of a feudal castle are seen frowning over the black ravine, and fitted for tales of romance. From it, the view into the valley of Aosta must be beautiful, but what access there is to these ruins cannot be traced, or even imagined, from the opposite bank, though this is so high above the torrent that the path seldom approaches it nearer than 200 ft.

This narrow defile continues during an ascent of more than 2 hrs. Sometimes the path is carried on terraces,

rudely formed of loose stones placed across rifts in the precipices; in others, the buttresses of rock are cut away to make the road high and wide enough to pass.'—[M.]

At about $1\frac{1}{2}$ hr. from Ivrogne, a torrent descending from one of the glaciers of the Ruitor is crossed, and in the opening to the rt. is seen the village of *Planaval*. 2 hrs. higher up the same lateral valley is the *Châlet du Glacier*, where Messrs. Mathews and Jacomb passed the night before their first ascent of the Ruitor. The main valley here turns nearly due S., and nearly 1 hr. farther the path reaches *Seris*, called on the Piedmontese map *Val Grisanche*, a miserable village, where none but the poorest accommodation is to be found.

From *Seris* the track to the *Col du Lac* turns aside nearly due W. Not far from the summit is a small lake, and a chapel dedicated to *St. Grat*. From 5 to 6 hrs. are necessary to reach the *Châlets du Bonnet*, about $1\frac{1}{2}$ hr. above the village of *Ste. Foi*. Further information as to this pass is desired. The scenery is probably superior to that of the next route, but the passage must be more difficult, as the latter is usually preferred.

2. *By the Col du Mont*. Nearly 11 hrs.

To reach this pass the main track up the *Val Grisanche* is followed from *Seris* for nearly 2 hrs. The scenery of the valley rapidly changes its character. Vast piles of *débris*, and precipitous masses of dark rock, take the place of *Alp* and pine forest, and the upper end of the valley, lying on the l. as the track turns to the *Col du Mont*, presents one unbroken scene of desolation.

'At *Fornet*, the highest village in the valley, the route to the *Col du Mont* leaves the *Val Grisanche*, ascends a steep path on the rt. by a torrent, and reaches some *châlets* on a small but fine pasturage. Above these the path skirts the brink of precipices over a deep gorge, and enters a basin in the mountains filled with rocks and stones brought down from the surrounding mountains,

the summits of which are crested with glaciers. The ascent is very steep for nearly 2 hrs. up a trackless loose path, and up fatiguing slopes of snow, steep, and many hundreds of feet across.'—[M.]

The col, which is a narrow ridge commanding a finely contrasted view of the bare and rugged *Val Grisanche* on the one side, and of the comparatively bright and fertile mountains that enclose the *Isère* on the other, lies between the *Ormelune* (10,833) to the S., and the *Becca du Mont*, which separates this from the *Col du Lac*, to the N.

'The *Col du Mont* was the scene of some desperate conflicts during the wars of the Revolution between the French and the Piedmontese. General Moulins, who commanded the former, after many efforts succeeded in gaining the position by advancing during a snow-storm, when such assailants were not expected, and retained it in spite of not less than ten efforts to repossess it. The height of the col, from the absence of all vegetation, must exceed 8,500 ft.

'After passing down a steep path, leaving on the l. black precipices—the haunts of the *chamois*—the beautiful pasturages belonging to the commune of *Ste. Foi* appear in a deep basin, bounded below by a forest. In less than 2 hrs. the highest *châlets* in this basin are reached, and in another hour the *châlets* of *Bonnet*, where the track from the *Col du Lac* (see above) falls in on the rt. Beyond *Bonnet* the road winds steeply down through a forest, and at length emerges to cross a torrent and enter the village of *Muraille*, where another bridge over a deep ravine leads to the hamlet of *Mazure*; thence traversing a brow on the mountain side, the road descends to *Ste. Foi*.'—[M.]

3. *By the Col du Clou*.

This pass, very rarely used, leads into the *Val de Tignes* several miles above *Ste. Foi*, and is better suited for a traveller who should wish to reach the *Val d'Aosta* from *Tignes* in one long day, than as a communication between the *Val Grisanche* and *Ste. Foi*. It leads, however, by a slight detour to *La Thuile*

de Ste. Foi (§ 11, Rte. B), where the accommodation is apparently not worse than at the main village. In fine weather the pass described in the next Rte. will be preferred by most mountaineers going from Tignes to Aosta, but for those travelling in the opposite direction the contrast between the wild desolation of the head of the Val Grisanche and the beauty and variety of the scenery on the Savoy side of the pass is not without attraction. A practised mountaineer making the pass from the W. side will not find a guide indispensable.

Above Fornet the peculiar character of the Upper Val Grisanche is the more fully appreciated, as all traces of cultivation and human industry disappear. The one or two châteaux that lie several miles higher up are lost in the stony desert that surrounds them. It is necessary to follow the valley nearly to its head before commencing the long and steep ascent of the stony slope on its W. side which leads to the col. This is probably from 8,600 to 8,700 ft. in height, and patches of snow usually lie near the top. The descent on the Savoy side lies about due W.; it is gentle, and before long the Alpine pastures appear green and covered with bright flowers. The botanist will here find *Draba fladnizensis*, *Cardamine Alpina*, and other interesting plants. After passing a châteaux, a very fine view is gained of the Aiguille de la Sassièrè, with a small Alpine lake in the middle distance. The descent to the valley of the Isère is throughout very beautiful, the latter part following the course of a torrent which reaches the main track from Ste. Foi to Tignes, about $\frac{1}{2}$ hr. S. of La Thuile de Ste. Foi.

ROUTE D.

TIGNES TO AOSTA, BY THE COL DE GAILLETTA AND THE VAL DE RHÊMES.

	Hrs.' walking	Eng. miles
Col de Gailletta . . .	4 $\frac{1}{2}$	9
Notre Dame de Rhêmes . .	4 $\frac{1}{2}$	10
St. George de Rhêmes . .	3	8
Villeneuve . . .	2 $\frac{1}{2}$	6 $\frac{1}{2}$
Aosta . . .	2	7
	16	40 $\frac{1}{2}$

The Val de Rhêmes has been all but completely neglected by travellers, although the scenery at its head is of the grandest character. It communicates with the Val Savaranche by a col (C. d'Entrelavi?) leading to the chief village of that valley, and with the Col de la Croix de Nivolet by the Col de Rosset (§ 14, Rte. F). As to both passes further information is desired, as also respecting the *Col de Bassac*, leading to the head of the Val Grisanche. The only pass into the head of the valley as to which authentic information has been obtained is the Col de Gailletta, described by Mr. Mathews in the second series of 'Peaks, Passes, and Glaciers.' Even when made only to Villeneuve, it involves a very long day's walk, and the wretched accommodation found at that place makes it advisable to push on to the shelter of a decent hotel at Aosta.

The first part of the way from Tignes is by the path taken in the ascent of the Aiguille de la Sassièrè (§ 11, Rte. B). It mounts by the S. side of the waterfall E. of the village, and above the cliff crosses to the rt. bank of the torrent, where it enters the upland valley in the midst of which lies the *Lac de la Sassièrè*, whose dull green waters are turbid from the fine glacial mud held in suspension. The way lies along the N. side of the lake, with the fine peak of the Sassièrè on the l. hand, and then ascends slopes of alternate rock and Alpine pasture, when a very fine glacier suddenly comes into view, with the peak of the *Grand Appareil* (nearly 12,000', W. M.) on the rt. Messrs. Mathews and Jacomb kept

along the rocks on the N. side of the glacier so as to avoid the most difficult part, and then threaded their way amidst intricate crevasses till they reached an extensive snow-plateau that continues unbroken to the col.

'The pass is one of the finest in the Graian Alps, and both in its foreground scenery and in the extent and interest of its distant views may bear comparison with some of the more celebrated cols of the Pennine or Oberland Alps. The summit of the col is far in advance of the Sassièrè. As we faced the Val de Rhêmes we had upon our l. hand tracks of snow of immense extent stretching towards the head of the Val Grisanche. On our rt. was the Grand Apparei, and immediately in advance of it a most peculiar peak, consisting of a tower of dark rock capped by a cone of snow. On the side of Savoy, beyond the Lac de Tignes, rose the graceful snow-peak of the Grande Motte, and the frowning precipices of the Casse, while on that of Piedmont we looked over the Val Savaranche to the magnificent masses of the Grand Paradis and the Grivola, and straight down the Val de Rhêmes to a section of the Pennine chain, of which the Grand Combin formed the central summit.'—[W. M.]

The height of the pass was found to be 10,149 English feet. To the l. is the great snow-field over which lies the supposed pass to the Val Grisanche referred to in Rte. C.

'The head of the Val de Rhêmes consists of a spacious amphitheatre, containing not less than four or five distinct

glaciers, all most imperfectly shown on the maps. It is divided into two bays by a projecting promontory, of which the remarkable tower-like peak above described forms the terminal point, and which is a most striking feature in all the views from the upper part of the valley. We descended close to it, keeping it on the rt., and after a rather difficult scramble down some rough rocks, alighted at 3 P.M. upon a spacious Alp, where we rested for dinner.'—[W. M.]

The first hamlet is called *Thumel*, and near to it the track to the *Col de Rosset* mounts to the SSE. About $1\frac{1}{4}$ hr. farther is the chief village, *Notre Dame de Rhêmes*. The *curé*, who inhabits the largest house, is said to be willing to receive travellers, and the accommodation is probably not worse than at *Villeneuve*. While the scenery of the head of the valley is very grand, that of its middle portion is tame and monotonous, relieved only by the fine peak of the Combin, which remains constantly in view. Several very poor hamlets are passed, and *St. George de Rhêmes*, the next village, has a miserable appearance. The chestnut, walnut, and, finally, the vine, become more abundant and luxuriant as the path, which here commands a fine view of Mont Blanc, approaches *Introd*, from whence a short descent leads to

Villeneuve (Rte. A), where the landlord of the chief inn (all bad) refused to Mr. Jacomb—who, with Mr. Mathews, made the whole distance from Tignes to Aosta in one day—food or drink until he should engage a bedroom for the night.

CHAPTER VI.

PENNINE ALPS.

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THE traveller who has explored the Alps in various directions, and surveyed them from several of the high points which offer an extensive panoramic view, can scarcely fail to have formed the conclusion that whatever the forces may have been that have raised so vast a mass of matter above the ordinary level of our continent, they have acted with peculiar intensity throughout the range which, to speak roughly, extends between the valley of the Rhone and that of the Dora Baltea from Mont Blanc to Monte Rosa. On studying a model, or even a good map, it becomes apparent that the importance of this range does not depend only on the fact that it includes all the highest peaks of the Alps, all but one of those exceeding 14,000 ft., and fully two-thirds of those over 13,000 ft. Throughout the whole central region of the Alps, from the valley of the Adige to the basin of the Isère and that of the Arve, a prevailing direction is observed in the chief valleys,

the key to which is to be found in the Pennine chain. We thus find that the range of Mont Blanc lies between two parallel troughs, the valley of Chamouni and the Allée Blanche, directed from WSW. to ENE.; that the same direction is repeated in the Val Pellina, the Val Anzasca, the valley of the Trient, &c., and that if we carry the eye across the whole of Switzerland, we constantly encounter ridges and depressions of the surface that conform to the same direction. A line drawn from Martigny to Coire, with a slight dislocation between Leuk and Visp, marks a great line of depression nearly 120 miles in length—traversed, it is true, by two ridges, and forming the channel for four different streams, yet essentially but one trough, parallel to and nearly a continuation of the valley of Chamouni. Farther E. another great parallel line of depression may be traced from Kauns, in the valley of the Inn, to the source of that stream, and then over the Maloya

Pass to Chiavenna, perhaps even from thence to Canobbio on the Lago Maggiore, and through the Val Vegezzo and Val Anzasca to the base of Monte Rosa. The line of lakes from Interlaken to Küsnacht, that between Orbe and Soleure, and the direction of most of the minor ranges of the Canton of Berne, all bear testimony to the existence of forces which have operated over a wide area, but which have produced their maximum effect in the range of the Pennine Alps.

The limits of the Pennine chain have been indicated in the preceding chapters. The valleys of Bonneval and Montjoie, between Bourg St. Maurice on the Isère and St. Gervais, and then the valley of the Arve to its confluence with the Rhone, mark the W. boundary. The pass of the Little St. Bernard, and the valley of the Dora Baltea as far as Ivrea, separate the Pennine from the Graian group. The valley of the Rhone, the pass of the Simplon, and the Val d'Ossola, serve to fix the N. and E. limits, and between Ivrea and Arona the massive buttresses of Monte Rosa sink into the plain of Piedmont. The mountain district of Chablais, lying between the Arve, the Rhone, and the Lake of Geneva, along with the adjacent Swiss valleys W. of the Rhone, is perhaps more intimately related to the Bernese than to the Pennine chain, but its contiguity to the latter makes it more convenient to include it in the present chapter.

Within the limits here indicated the Pennine chain presents a tolerably continuous range about 70 English miles long, in a straight line from the SW. end of the Mont Blanc range to the Fletschhorn, with two great dislocations. The one, between Mont Blanc and the Vêlan, gives place for the only passes in the chain that fall below the level of perpetual snow. The other dislocation is seen in the irregular zigzag line described by the crest of the chain between the Matterhorn and the Fletschhorn, forming the range of Monte Rosa.

The pre-eminence of Mont Blanc

over every other summit of our continent, the interest attaching to its ascent by Saussure, and the grand scenery of the valley itself, all combined to make Chamouni one of the earliest resorts of Alpine travellers, so that even before the French Revolution many strangers were seen in a valley which but a few years earlier was almost unknown. After the peace in 1814 the stream of tourists began to flow in the same direction. The natives of the valley saw and used the advantages put in their way, and early established inns much better than were found elsewhere in the Alps. The number of visitors constantly increased, but until a comparatively late period Mont Blanc and the pass of the Great St. Bernard were the only portions of the Pennine Alps at all generally known. A few Swiss and German naturalists, and a still smaller number of adventurous Englishmen, had followed on the footsteps of Saussure in the valleys surrounding Monte Rosa, but it is only within the last twenty years that general attention has been directed to that region, which, although far less easy of access, is now recognised as second to none other in the union of all the elements of the sublime in nature. Still more recently, and mainly through the exertions of members of the Alpine Club, the central portion of the Pennine chain has been thoroughly explored, and the establishment of tolerably good inns at Evolena and Zinal will probably soon be followed by the appearance of others in the Val de Bagnes and the Val Pellina. The southern valleys of Monte Rosa are now pretty well supplied with inns, and every year sees some improvement in the provision made for travellers.

SECTION 16.

MONT BLANC DISTRICT.

THE mountain mass which includes the highest summit of our continent lies

between the two parallel valleys of Chamouni and the Allée Blanche,* the latter being formed by the meeting of two torrents which flow in opposite directions towards the village of Entrèves, and escape to the SE. by a broad opening between the Mont Chétif and the Mont de la Saxe to form the main stream of the Dora Baltea. It is questionable whether the range may most properly be described as a single ridge, throwing out on the N. side † massive buttresses, which are crowned by towers and pinnacles that rival in height those of the central ridge, or as two parallel ridges linked together by connecting walls of rock, and with this peculiarity, that the northern ridge is broken through by numerous gaps, through which the vast accumulations of ice formed in the central basins are drained by the glaciers descending into the valley of Chamouni. At the W. end of the range several great glaciers descend into the Val de Montjoie, while the opposite extremity, limited by the Val Ferrex, the Dranse, and the Trient, is also bordered by numerous glaciers whose streams are poured into those valleys.

As already explained, the principal ridge of this range is that which rises on the S. side immediately above the Allée Blanche. Although the crest does not maintain continuously so high a level as that of Monte Rosa, this may be pronounced for combined length, height, and steepness to be the most formidable barrier existing in the Alps. Throughout the space of 18 m., between the Aiguille du Glacier and the Mont Dolent, but two passes—the Col du Géant and the Col de Miage—have

ever been effected, while the ridge of Monte Rosa is now known to be accessible in many directions. The passes discovered of late years, which are approached by the Glaciers du Tour and Argentière, lead into the Swiss Val Ferret, and not to the Italian side of the range.

The name Mont Blanc is sometimes applied collectively to the entire, or to a great portion of the range; we here confine it to the central peak which overtops all its attendant peaks and aiguilles by nearly 2,000 ft., and is cut off from its chief rivals by the Col de Miage on the W., and on the NE. by the depression between the Aiguille du Midi and the Mont Blanc de Tacul. The latter projecting point, as well as the higher eminence called Aiguille de Saussure, are properly but portions of the main peak, and the same may be observed of the continuous ridge which extends from the top by the so-called Bosse du Dromadaire and the Dôme du Gouté to the Aiguille du Gouté. The remaining portion of the range of Mont Blanc is not naturally divided into large and distinct masses, but exhibits in extraordinary perfection that characteristic form of sharp craggy pinnacle that has received the name *Aiguille*. Most of those in the neighbourhood of Chamouni, the Allée Blanche, and the Val de Montjoie are known by distinct names, but this does not hold as to the less accessible part of the range, and there is no reason why Alpine topography should be overlaid by a further increase of separate names for each pinnacle in a range where these are counted by hundreds.

Two outlying ranges closely connected with the Mont Blanc range are included in the present section. To the N. of the valley of Chamouni the range of the Aiguilles Rouges, connected with the Buét, but nearly separated by the glens of Valorsine and that of the Dioza, cannot well be detached from the adjoining valley of Chamouni. For the same reason the range of the Cramont, between the Allée Blanche and the road of the

* This is correctly written La Lex Blanche, but it does not seem possible to change the received spelling. We here apply the name to the entire valley, although the E. portion is frequently distinguished as Val Ferrex and a small part towards the centre is sometimes called Val de Vénì.

† For convenience, we speak as if the range of Mont Blanc lay E. and W., but it will be recollected that the true direction of the main ridge, and of the valleys on either side, approaches NE. and SW.



Little St. Bernard is not placed apart from Courmayeur, which lies close to its base.

The two Alpine villages above named, Chamouni and Courmayeur, are the natural head-quarters to which travellers resort, according as they would establish themselves on the N. or S. side of the range. A mountaineer may find very tolerable accommodation, for which he will be made to pay liberally, at many points higher up, and conveniently placed for glacier excursions and ascents. It results from the form of the range rather than from any want of speculative keenness on the part of the inhabitants, that there is not here any inn in a central position and at a considerable height, as on the Riffel or the Aeggischhorn, where a mountaineer can sojourn with satisfaction while exploring the surrounding peaks. On the other hand it may be remarked, that there is no great mountain mass so admirably provided with natural *belvederes*, whence it may be viewed on every side, as that of Mont Blanc. These are the Brévent, the Cramont, and the Mont Joli, all of them possessing the great advantage that a deep valley lies between the observer and the main range rising on the opposite side.

On all sides of Mont Blanc the language of the natives is a more or less corrupt French patois.

ROUTE A.

PARIS TO CHAMOUNI, BY GENEVA— EXCURSIONS FROM CHAMOUNI.

	Kilomètres	Eng. miles
Culoz	560	348
Geneva	67	41½
Bonneville	28	17½
Cluses	14½	9
Sallanches	16	10
Servoz	14½	9
Chamouni	16	10
	716	444½

Railway from Paris to Geneva in 14 hrs. 40 min.
Diligence from Geneva to Sallanches in 6 hrs.
Light carriages from Sallanches to Chamouni in 4 hrs.

The only direct train from Paris to Geneva is the night express, leaving

Paris at 8 P.M. This reaches Culoz (§ 10, Rte. A) at 9.3 A.M., in conjunction with the train which starts from Lyons at 5.40 A.M., and arrives at Geneva at 10.40 A.M. Above Culoz the valley of the Rhone mounts due N. for 20 m. along the E. base of the Mont Colombier (§ 10, Rte. A), and the limestone range which extends thence to the *Valserine*; the rly. keeps to the rt. bank, passing *Seyssel* and *Pyrimont*, places chiefly known for the extensive deposits of asphalt which occur in this neighbourhood, and supply their produce to all Europe. To the N. the valley seems to be closed by the steep face of the *Credo* (5,328'), the S. extremity of the main range of the Jura. After passing through four tunnels the rly. reaches *Bellegarde* (H. de la Poste; H. de la Perte du Rhône), formerly a place of some note because of the meeting of the diligences from Paris, Lyons, and Geneva. A traveler not overpressed for time will do well to halt here to visit the *Perte du Rhône*. In passing round the base of the *Credo*, and between that mountain and the *Vuache* on the opposite bank, the Rhone has cut through thick deposits of diluvium, and, on reaching the underlying limestone has so worked into this and enlarged the fissures with which it abounds, that in one place the entire stream passes through the subterranean passage so excavated, and for a short space disappears from the light of day. This is, however, only true when the waters are low; at other times the underground passage is insufficient, and a portion of the stream passes above the natural bridge. Equally well worth seeing is the junction of the *Valserine* with the Rhone, which occurs close to Bellegarde. When the former stream is not too full, it is possible to descend into its bed and observe the vertical walls of the chasm which it has worked in the rock. A guide is not required to find the *Perte du Rhône*. Beyond the bridge by which the post road crosses the *Valserine* the first road turning



down to the rt. leads in 8 or 10 min. to the wooden bridge which marks the spot. At Bellegarde the railway crosses the gorge of the Valserine by a very fine viaduct, 160 ft. in height, and then enters one of the most considerable railway tunnels on the continent, $2\frac{1}{2}$ m. in length, cut through the base of the Credo. On escaping from the tunnel the line passes between the river and the rocky face of the mountain, under the Fort de l'Écluse (1,388'), which guards this entrance into France. After passing two small tunnels, the mountains on either side recede from the Rhone, and the railway enters the undulating plain which extends to the Lake of Geneva, and the neighbourhood of the city is marked by the well-known ridge of the Salève seen on the rt. In $21\frac{1}{2}$ m. from Bellegarde it reaches

GENEVA (Inns: H. de la Métropole, opposite the new Jardin Anglais, on the l. bank of the Rhone, very large, and said to be well kept; Écu de Genève, on l. bank, by the Pont des Bergues, very well kept, rather dear, perhaps the best for families; H. des Bergues, on the rt. bank (the front windows have a glimpse of Mont Blanc), dear; H. d'Angleterre, H. Victoria; this and the last are near the rly. station, and are said to be well conducted and reasonable; H. de la Couronne, l. bank, much frequented, rather cheaper than the three first mentioned; H. du Lac, l. bank; H. du Rhône, l. bank, clean and reasonable; H. des Étrangers, in the new quarter on rt. bank; H. de la Balance, away from the river, second-class house, but clean, comfortable, and moderate; Lion d'Or; Grand Aigle; H. du Nord), the capital of the smallest canton in Switzerland, but the richest and most important city of the Confederation, which, in part through its natural advantages, in part through the intellectual activity of its inhabitants, but mainly because, with the exception of the French domination between 1798 and 1814, it has maintained for centuries its political independence, has held a place in Europe quite disproportioned to its population

and resources. Although there is no city, for its size, so well supplied with hotels, the number of strangers is at times so great, that, when ladies are of the party, it is prudent to secure rooms beforehand, as those who neglect the precaution are sometimes driven to inns of the lowest class. The town has been almost rebuilt and largely increased during the last 30 years, and from its former mean appearance has put on an aspect of wealth and stateliness befitting its admirable natural position at the outlet of the finest of the Swiss lakes, in a rich stripe of country that lies as in a bay between the Jura and the Alps. To effect these changes, it has been necessary, at some sacrifice of the picturesque, and perhaps also of patriotic feeling, to remove the ancient fortifications, which are now replaced by new streets, promenades, and gardens. The rly. station which, besides serving the trains from Paris and Lyons (keeping Paris time), is the point of departure (by Berne time) for Lausanne and the Valais, or for Berne, Neuchâtel, Bâle, and the whole N. of Switzerland, stands just outside the town on the N. side; the lake steamers, on the contrary, start from the Grand Quai, on the l. bank of the Rhone, whereon all the principal hotels (except the Bergues) are situated.

The ancient cathedral, built in the 10th and 11th centuries, but injured by subsequent alterations, and especially by the façade erected in 1749, contains some interesting monuments.

The Public Library, with many precious MSS., including numerous autograph letters and manuscript works of John Calvin, is open daily, from 11 A.M. to 4 P.M.

The Musée d'Histoire Naturelle, in the Grande Rue, is interesting to the student, on account of the original geological collections of Saussure and Necker, the fossil plants of Brongniart and De Candolle, and other collections named by the distinguished men who have made Geneva one of the centres of European science. The antiquary will also find some objects worth his

notice. This museum is open to the public only for two hours on Sundays and Thursdays; but a stranger may gain admission at other times.

Lunel's Zoological Museum of the Alps, at Plainpalais (entrance 1fr.), is very well arranged, and the specimens are in good condition.

The Musée Rath, founded by General Rath, comprises casts from the antique and from Pradier's best statues, and a collection of pictures, including several good specimens of Calame and Diday, the most eminent Swiss landscape painters. It is open to the public on Sundays and Thursdays, from 11 A.M. to 3 P.M.; at other times on payment of 1fr.

A large model of the range of Mont Blanc, exhibited in the new Jardin Anglais, will be interesting to many mountaineers. Admission from 11 A.M. to 3 P.M.; on Sundays and Thursdays free; at other times 1fr. each.

The Botanic Garden, founded by the elder De Candolle, is very well kept.

The observatory is under the direction of Professor E. Plantamour, well known for his valuable contributions to Alpine Meteorology. Meteorological observations are made every second hour between 6 A.M. and 10 P.M., corresponding with similar observations at the Great St. Bernard. A traveller carrying a barometer should not omit to compare with the Geneva standard. The height of the cistern above the sea-level is 408 metres, or 1,338.6 English ft.

Just beyond the port, on the E. shore of the lake, are two ice-borne granite boulders, projecting out of the water, and called Pierres de Niton, from the traditional belief that they were anciently used for sacrifices to Neptune. Their height above the sea-level is 1,231 ft.

Geneva abounds in boarding-houses and *pensions* suited to the various wants and means of the large number of foreigners who resort hither for education, society, economy, or attracted by the scenery of the city and its neighbourhood. The charges vary from 100 to 300 fr. a month. It is wise to con-

sult some respectable inhabitant before making a selection.

An English club, with reading-rooms, &c., has been opened at No. 5, Quai du Mont Blanc. Gentlemen are admitted for a single day, or for a longer period.

English goods of every description are found here better than at most towns on the continent.

The British consulate is in the Rue du Rhône.

Several of the Genevese physicians have studied in England, and speak English perfectly; and Dr. Metcalfe, an English physician, resides for the greater part of the year at 3, Quai du Mont Blanc.

Omnibuses ply between the town and the rly. station, and also to and from Carouge and Fernex.

Fiacres, or voitures de place, cost 2.50fr. per hour, and 65c. for each $\frac{1}{4}$ hr. additional. Charge for a drive round the town, by the 'Nouvelle circonscription,' 1.50fr.

Small boats with a single rower for short excursions on the lake are charged 2 or 3fr. an hour.

Cafés are numerous, and it is not unusual for persons staying at an hotel to breakfast at a café. The Cafés du Nord, de la Couronne, and de la Métropole, are amongst the best. The first is also a good *restaurant*.

Smokers may prudently supply themselves with cigars or tobacco at Geneva.

The public walks in and about the town may challenge comparison with those of any city in Europe. The foot-bridge, Pont des Bergues, and the Ile Rousseau, with Pradier's fine statue of J.-J. Rousseau, dividing the waters of the 'arrowy Rhone' just as they issue from the lake, is the first point of attraction to strangers; but the new promenades on the site of the old bastions also deserve a visit.

The environs of Geneva are studded with villas, which for the most part command beautiful views of the lake and the mountains. In the opposite direction from the lake, the junction of

the Arve with the Rhone, about 1 m. out of the town, is worth a visit. The former is laden with the impalpable powder into which the rocks of Mont Blanc are ground beneath the glaciers that feed the stream, and, in addition to this, with the detritus of the sedimentary deposits through which it flows from Sallanches to Geneva; while the waters of the Rhone, after depositing their impurities in the bed of the lake, acquire the exquisite blue tint that fascinates the common observer and excites the curiosity of the man of science, who has not found a completely satisfactory explanation.

The mountaineer when within sight of the snowy Alps is not likely to halt long at Geneva; but among the numerous points of view which may be reached from hence are some that in their way can scarcely be surpassed. The range of the *Jura*, extending from the Mont Colombier, near Culoz, to Soleure, forms a natural terrace from whence to survey the Swiss and Savoy Alps. One who ascends to a height of 3,000 or 4,000 ft. anywhere in the range, overlooks the intermediate lower country, and takes in some considerable portion of the great girdle of snowy peaks that encloses the basin of the Rhone. The effect of this panorama is immeasurably increased when a broad expanse of water lies in the space between the eye and the distant background; and hence it happens that the finest views from the *Jura* are those obtained from the parts of the range near the W. end of the Lake of Geneva, or from above Neufchâtel. The latter position is the more central, being about equidistant from the highest peaks of the Savoy and the Bernese Alps. The *Jura* above Geneva is much nearer to Mont Blanc than to the Bernese chain, the former being about 60 m. distant, and the panorama, though more striking towards the SW., is less complete; but the Lake Lemman, extending from the spectator's feet for a distance of 40 m., with its broad channel gradually contracted between heights which rise higher and higher on either

hand until they merge in the background of snowy peaks, is an object which, when seen under favourable circumstances, can never be forgotten. To enjoy this view it is not necessary to reach the higher summits of the *Jura*, which surpass by some 1,200 ft. the general level of the range. It may be obtained, without trouble, by mounting the old road leading from Geneva to Dijon by Gex and La Vattay, to the *Col de la Faucille* (4,374'), or rather less perfectly from the road which was at a later period preferred, by Nyon and *St. Cergues*. The pedestrian will, however, be tempted to reach the summit of *La Dôle* (5,519'), lying between these two roads, which is, perhaps, the most desirable point from whence to view this matchless panorama. The *Dôle*, being the highest summit in the *Jura* range, overlooks an extensive horizon to the N. and W., and at its W. base lies the Val de Dappes, long in dispute between France and Switzerland, but lately become the subject of amicable compromise. The road from Geneva to Gex passes the *Château de Fernex*, long inhabited by Voltaire, and visited by strangers for the sake of the various memorials which were preserved there. The place has lately fallen into the hands of a wealthy tradesman, who has transformed the house and grounds, and destroyed or removed the relics which had so long formed the admiration of sight-seers.

The *Réculet* is one of the summits of the *Jura* due W. of Geneva, not commanding quite so fine a view as the *Dôle*, but more interesting to the naturalist, because of its varied flora.

The *Salève* is a ridge of limestone lying S. of the city, partly divided by a depression, or gap, where stands the village of *Monetier* (pronounced Montier). To the NE. of Monetier is the Petit Salève, and in the opposite direction the far larger mass of the Grand Salève (4,537'). The escarpment towards the city is so steep as to be in great part quite inaccessible; but the gap between the two portions of the

mountain is easily reached by a steep path, partly cut in the rock, called Pas de l'Echelle, leading direct to the village, where there is a comfortable stopping-place—Hôtel et Pension de la Reconnaissance—sometimes resorted to for change of air. From Monetier the Petit Salève is reached with ease by ladies. The Grand Salève involves an ascent of $1\frac{1}{2}$ hr., passing a herdsman's cottage, near to a few solitary trees, called Châlet des Treize Arbres. The SE. slope of the mountain facing the valley of the Arve is covered with blocks of protogine, evidently originating in the Mont Blanc chain. The mode of transport of these blocks has been long a question among geologists. Fatal accidents have arisen from attempts to descend the Salève through gullies which are practicable above, but become gradually steeper, and terminate in precipices. One of these gullies, called La Grande Gorge, though steep, is quite accessible, and is often visited by botanists. The mountain is rich in rare plants, among which *Arabis saxatilis*, *Hieracium andryaloides* and *H. glaucum*, and *Orobanche Laserpitii Sileris* may be specified.

There are two departures daily from Geneva to Chamouni by diligence to Sallanches in 6 hrs., and from that place in 4 hrs. to Chamouni by chars or light two-horse carriages. A place through to Chamouni costs about 15fr. Many of the diligences are arranged with seats for passengers covering the entire roof, as in fine weather few persons willingly travel inside. A char from Geneva to St. Martin costs 30fr., and to Chamouni 45fr. There is no advantage whatever in engaging places to return from Chamouni to Geneva either by diligence or hired carriage, as those who may not be tempted to vary the road for returning to Geneva may always find means of conveyance. A pedestrian taking his place to St. Martin, and walking on from thence, may easily reach Chamouni half an hour before the diligence passengers, thus gaining an advantage over those

who have not taken the precaution to secure rooms beforehand.

At *Annemasse* (Inns: Balances; Lion d'Or), about 4 m. from Geneva, is the French frontier, with passport and custom-house offices. As usual with French officials, they are commonly civil and easy-going, but at times carping and vexatious. The road keeps over an undulating plateau at some distance from the Arve, and after crossing the *Menoge* by a modern lofty bridge of three arches, standing above a single inferior arch, passes the village of Nangy, and leaves on the l. hand the road to Sixt by St. Jéoire and Tanninges (§ 17, Rte. A.), before reaching

Contamines (Inn: Écu de Savoie), at the western base of the *Môle* (6,128'), a conical mountain presenting a fine appearance from this road. To the l., on a steep rock, stand the ruins of the Castle of *Faucigny*, which gave its name to this province of Savoy. The valley of the Arve now lies between the *Môle* to the N. and the *Brezon* (6,031'), a favourite resort of botanists, to the S., and on the rt. bank stands

Bonneville (Inns: Écu de Genève; Couronne; Balances), formerly capital of the Province of Faucigny. For the routes to Annecy and Thones, see § 12. From hence the summit of the *Môle* may be reached in $3\frac{1}{2}$ hrs. and that of the *Brezon* in $3\frac{3}{4}$ hrs. From the latter mountain it is easy to descend by *Saxonner* to Cluses.

There is a new road from Bonneville by the rt. bank of the Arve, which is used by passengers bound for St. Jéoire or Tanninges, but the opposite bank is preferred by those going to Sallanches. A straight and dusty road along the l. bank leads to *Vougy*, opposite the junction of the Arve with its most important affluent, the Giffre, descending from the valley of Sixt (§ 17); 4 m. farther is *Seionzier*, near the entrance to the wild and picturesque glen of the *Reposoir* (§ 12), and in another mile the traveller, after crossing the Arve, reaches

Cluses (Inns: Écu de France; Union),

a small town devoted to watch-making, burnt down in 1844, and since rebuilt. A char-road from hence leads over the ridge to the N. by Châtillon to Tanninges, about 6 m., or to Samoens about 12 m. Below Cluses, which is but 390 ft. above the level of the Lake of Geneva, the Arve has flowed through a wide bed through a comparatively open country. From hence for several miles it passes through a narrow defile, forming a worthy portal to the grand scenery that awaits the traveller who would approach its sources in the glaciers of Mont Blanc. This defile, which mounts nearly due S., is commonly called *Vallée de Magland*, and lies between the *Chaîne des Frêtes*, the limestone range separating the Arve and the Giffre, and a nearly vertical wall of rock which extends continuously to the Mont Fleuri above the Chartreuse du Reposoir. At the hamlet of La Balme, $2\frac{1}{2}$ m. beyond Cluses, the defile opens a little, and a slope of débris, 800 ft. high, marks the spot where a cavern penetrates deeply into the limestone. This has been turned to account by the speculative spirit of the natives. The admission is charged 3fr., and mules are kept to carry up passers-by who may be tempted to visit the cave. It is not, however, particularly well worth the delay to anyone who has seen similar caverns, common in all limestone districts. Another mode of extracting francs from strangers is practised here, and at the Nant d'Arpenaz, 5 m. farther on, by firing small cannon, whose reverberation between the steep rocks on either side of the defile produces a striking effect. Farther on a powerful spring bursts out by the road-side, which was supposed by Saussure to be the outlet of the Lac de Flaine, an Alpine tarn on the upper level of the *Chaîne des Frêtes* (§ 17, Rte. B), and immediately beyond is the village of Magland, whose population seems to live by dealing in echoes, scraps of crystal or pyrites, and by more direct appeals to the charity or weakness of the crowds of strangers

who pass here throughout the summer. 3 m. farther, about 7 m. from Cluses, is the Nant d'Arpenaz, one of the highest waterfalls in the Alps, being about 850 ft. from top to bottom, but, except after heavy rain or in the spring, the volume of water is so small that it is broken into spray long before it reaches the lower ledge, and, save at such times, it is scarcely worth the trouble to approach it nearer than the road. 2 m. farther, where the valley opens out at the W. foot of the Aiguille de Vêran, is the small village of *St. Martin* (Inns: H. du Mont Blanc, tolerably good, dear; Croix Blanche). Travellers for Chamouni on foot or in hired carriages have no occasion to cross the Arve, but the diligences all do so, making a detour of $\frac{3}{4}$ m. to and fro, in order to reach

Sallanches (Inns: Belvedere; Le-man), a little town (1,793') which was completely destroyed by fire in 1840, and has been since rebuilt with much improved houses. The diligences halt for dinner while the carriages that are to carry the passengers to Chamouni are being got ready. The entertainment is said to be indifferent and dear, and passengers are advised to content themselves with a luncheon at a little restaurant adjoining the diligence office, and reserve themselves for a more substantial and better cooked dinner at Chamouni in the evening.

The view of Mont Blanc from this part of the valley of the Arve is justly celebrated, and is, indeed, in some respects unique in the Alps. The views of the higher mountains when not seen from a great distance are almost always gained from some narrow valley, where a limited portion only can be seen, or else from some ridge or summit that overlooks the intermediate valleys. Here at the foot of the range of Mont Blanc, the valley of the Arve, between the *Vallée de Magland* and the *Val de Montjoie*, opens out in a broad basin with the entire W. end of the range fully in view, a fertile plain in the foreground, and the pine-

covered heights that enclose St. Gervais filling the middle distance. In perfect symmetry, without the sameness that is the fault of human architecture, the summit of Mont Blanc occupies the centre of the picture. To the l. is seen the Dôme du Goûté, and the ridge connecting it with the Aiguille de Bionnassay, while beyond these are perceived the Aiguille du Midi and Aiguille Verte. On the rt. of the summit the Aiguille de Miage is conspicuous, and beyond it the peaks that connect it with the Col du Bonhomme. The Glaciers of Bionnassay and Miage are seen surrounded by the formidably steep ridges that enclose their upper basins, and a great part of the way to the summit of Mont Blanc by what is called the St. Gervais route, and a part of the pass of the Col de Miage, may be traced in detail through the glass. It is true that the distance in a direct line to the summit of Mont Blanc is very nearly 14 miles, but as it is raised 14,000 ft. above the level of the valley, the angular elevation is as great as is compatible with a general view. The Monte Rosa as seen from the Val Anzasca is a more wonderful, perhaps also a more fascinating object, but for massive and stately grandeur this aspect of Mont Blanc surpasses all rivals. The view may be seen in perfection from the bridge close to St. Martin, and it is quite unnecessary to diverge to Sallanches out of the traveller's direct course.

Several interesting excursions may be made from Sallanches or St. Martin, but most of these are equally accessible from St. Gervais (Rte. C), which is a more agreeable stopping-place. The ascent of the *Aiguille de Vêran*, commonly but incorrectly written *Varens*, is an exception to the last observation, as it immediately overhangs St. Martin, and requires a full day's work to go and return. A guide is necessary, as the ascent is very steep in parts, and the successive barriers of limestone rock which require to be scaled are accessible only in places where a few steps have been cut to make them practicable.

In about 3 hrs. from St. Martin the traveller reaches a very singular tract of nearly bare rock, extending for several miles along the upper part of the ridge separating the Arve and the Giffre, and surmounted by numerous peaks and shattered ridges of singular form. On the undulating surface of this plateau, called *Désert de Platei*, the action of the elements has worked parallel fissures in the limestone resembling in form and arrangement the crevasses of glaciers. The Aiguille de Vêran is 8,975 ft. in height, and necessarily commands a grand view. (See § 17, Rte. B.)

The road from St. Martin to Chamouni, so much improved of late years as to be practicable for two-horse carriages, follows for about $2\frac{1}{2}$ m. the rt. bank of the Arve, here retained within its bed by massive embankments. Near the village of *Passy*, lying to the l. of the road, is the junction of the Arve with the *Bonnant* issuing from the valley of Montjoie, at the base of a mountain ridge which is in fact a spur issuing from the main ridge of Mont Blanc and connecting the Aiguille du Goûté with the *Vaudagne*. This ridge forms a barrier across the W. end of the valley of Chamouni, which would retain therein the waters of the Arve, if that stream had not found a circuitous way through a gorge, partly cut out by the stream itself, that circles round the N. side of the Vaudagne. Through this gorge the road to Chamouni begins to ascend near the village of *Chède*, whence a char-road along the W. base of the Vaudagne leads to the Baths of St. Gervais (Rte. C). Tourists often visit a pretty waterfall that lies about 15 min. l. of the village, but the little lake which formerly reflected the snowy peak of Mont Blanc in an exquisite framework of rock and pine forest was completely choked up with rocks and débris by a landslip in 1837. Above the site of the lake the Pont aux Chèvres, a wooden bridge over the Arve, leads by a footpath to the Pont

Pelissier in rather less time than the road. A little farther the road crosses the *Nant Noir*, a torrent that borrows its name from the anthracitic slates through which it descends, and in violent rains has frequently made the road impassable to man or beast. The defile of the Arve is here enclosed on the N. by the *Rochers des Fys*, a lofty range of shattered peaks, one of which fell with a terrific crash, mistaken in the neighbouring valleys for the outburst of a volcano, in 1751. The huge pile of débris called *Dérochoir*, between the *Aiguille de Platei* on the W. and the *Aiguille d'Ayer* to the E., marks the site of the catastrophe. Here the defile opens a little, giving place to the village of

Servoz (Inns: Unvers, tolerably good and reasonable; Balance), formed of two clusters of houses, about 2,626 ft. above the sea. Near the church is a cabinet of minerals kept for sale. This is the most convenient starting-point for a visit to the *Rochers des Fys*, and for the mule-path to Sixt over the Col d'Anterne (§ 17).

The summit of the Buët may also be reached in 8½ or 9 hrs.' steady walking (see § 17, Rte. D). Deschamps and Felizas have been recommended as guides. By the bridge over the *Dioza*, which descends from a glacier of the Buët, is a monument to F. A. Eschen, a German translator of Horace, who perished on that mountain in 1801. Above Servoz the gorge of the Arve is again contracted, and in about 1½ m. the road passes to the l. bank by the Pont Pelissier, where it is joined by the foot-path from Chède. Here follows a steep ascent over ice-worn rocks, whereon may be observed erratic blocks of protogine from the centre of the Mont Blanc range, left on the slope by the retirement of the ancient glaciers. After mounting 2 m. nearly due S. from the bridge, the road emerges from the defile of the Arve, turns to the l., and looks along the whole length of the valley of Chamouni to the Col de Balme at its E. extremity.

The first impression of the stranger on entering this famous valley is probably that of disappointment. Its unusual direction, parallel instead of perpendicular to the main range, leaves no striking object to close the vista, and the great aiguilles that enclose the Mer de Glace, and which, as seen from the valley, are far more striking objects than the summit of Mont Blanc, are better viewed some miles farther on than from the W. end, where the peak of Mont Blanc is also concealed behind the huge mass of the Dôme du Goûté. The objects which chiefly attract attention are the great glaciers descending along the S. side of the valley through each of the openings that give access to the upper level where the snows accumulate. The two nearest comparatively insignificant glaciers are the *Gl. de Griaz* and *Gl. de Borgeat*, lying on the steep slope of the Aiguille du Goûté. Beyond these is the *Gl. de Tacconnay*, divided by the Montagne de la Côte from the still more imposing *Gl. des Bossons*. Farther off, beyond the Prieuré, is the *Gl. des Bois*, but the great glaciers of Argentièrre and Tour are not visible. The effect is most striking to one who arrives late, and has the good fortune to see the glaciers partially lighted by the moon in her second quarter. By daylight the colour of the ice is less brilliantly white than is commonly expected, and the eye, still unused to the grand scale of all the surrounding objects, does not adequately estimate the dimensions of these vast streams of ice. The first village in the valley is *Les Ouches*, sometimes written Les Houches, with a little inn (H. des Glaciers). From hence the ascent is very gentle during the five miles that lead to the chief village: about half way, just after passing the lower end of the Glacier des Bossons, the road crosses back to the rt. bank of the Arve, and at each step the great Aiguilles surrounding the Mer de Glace come more fully into view, until the traveller reaches

CHAMOUNI (Inns: H. Royal de

l'Union, with two houses on opposite sides of the Arve—that on the S. side has the best rooms; H. de Londres et d'Angleterre,—also with two houses; H. de Saussure with a dependance which was formerly the Hôtel de la Couronne. The above are all first-rate hotels, with first-rate prices, usually crowded during the season. Less handsomely got up, but clean and comfortable, is the H. Mont Blanc; 'visitors are taken *en pension* at 7fr. a day, and for 6fr. if they remain over 6 days;' another minor inn, Au Rendezvous des Amis, is said to be decently kept and moderate in prices). When ladies are of the party, it is imprudent not to secure rooms beforehand. Much nonsense has been written about the supposed discovery of Chamouni in the last century, but Mr. Markham Sherwill, in a tract published at Geneva, traced the authentic history of the valley up to the foundation of a Benedictine priory, about A.D. 1090, from whence the village is generally known in the valley as *Le Prieuré*. To strangers it is universally known by the name Chamouni, derived from some fences or entrenchments, whence in early Latin documents came the name Campus Munitus, and in the local patois Champ Mouni; and on this account we reject the commoner, but corrupt, spelling, Chamonix.

This large village, now grown nearly to a town, 3,425 ft. above the sea, subsists by the great influx of strangers, who come either to enjoy the grand scenery of the neighbourhood, or to follow a prevailing fashion. In fine weather few persons can be quite indifferent to the objects in view even from the village; but on wet days, or when the clouds lie low, no rare occurrence, time hangs rather heavily on the hands of most travellers. Reading rooms and billiard-tables have, however, been established of late years, and some will find an interest in examining the collections of minerals, plants, insects, &c., kept for sale by some of the more intelligent guides, and the models of Mont Blanc and Monte Rosa, executed by

Michel Carrier. There are several shops where articles in carved wood, polished stones, and crystal ornaments are on sale.

An English church was opened here in 1860.

The chief occupation of the men in the valley is that of guide, and it is but justice to say that, as a body, the Chamouni guides are a very respectable and trustworthy set of men, and that the best amongst them have few rivals in all the qualities that make a first-rate mountaineer, though they may want something of the *dash* that is found among the foremost of the Bernese Oberland guides.

For many years the Chamouni guides have formed a sort of corporation, subject to regulations issued by Government authority. These regulations were thought by many to exercise an injurious influence over the men themselves, as they certainly interfered with the liberty of foreign travellers. Remonstrances urged from various quarters, but especially by the Committee of the Alpine Club, obtained from the Piedmontese Government a revision of the rules by which most of the more obnoxious regulations were modified. On the cession of Savoy to France, the old rules were revived, and new representations were addressed by the Alpine Club to the French authorities. The result was to procure the issue of a new code of regulations, which have been in force since the month of May 1862, and which are in many respects an improvement upon those which preceded them. It may be convenient to travellers to find here a summary of the rules, and of the tariff which is annexed.

The body of guides consists of natives of the valley admitted to the roll by the sub-prefect after previous evidence of fitness and good moral character, and an examination showing a fair elementary education and a thorough knowledge of the district. A chief guide is appointed by the prefect to superintend the discipline of the men, and to advise and assist travellers in

the organisation of such expeditions as they may desire to make. A guide is liable to suspension or removal from the roll for misconduct, drunkenness (which is happily very rare), or for proved incompetency.

Each guide is appointed to accompany travellers according to his turn in the list, but travellers are permitted to choose their own guides under the following contingencies:—

1. If they desire to undertake dangerous expeditions, and such as are classed as extraordinary.
2. If occupied in scientific pursuits.
3. If, being ignorant of French, they choose a guide able to speak English, German, Italian, or any other foreign tongue.
4. If in some former visit they have been accompanied by the guide whose services they demand.
5. If (being ladies) they go unaccompanied by a gentleman.

Excursions are divided into two classes—ordinary and extraordinary. On ordinary excursions one guide is considered sufficient for a party, however numerous, except that to the Jardin, where, if the party exceeds three in number, two guides must be taken. Extraordinary excursions include Mont Blanc, the Col du Géant, and generally all glacier expeditions above the level of vegetation, and expeditions among the Swiss and Italian Alps. For Mont Blanc, a single traveller must take three guides, and one additional guide must be added for each additional traveller; but for one of the guides it is allowable to substitute one or more porters. For the Col du Géant one traveller must take two guides, two must take three guides, and above that number there must be one guide for each traveller. On other high glacier expeditions the number of guides must be at least equal to that of the travellers.

Members of the Alpine Club, and such other travellers as can give evidence of having made several difficult expeditions in the higher regions of the Alps, are exempted from all restrictions,

both as to the choice of such guides as they may prefer, and as to the number of guides that they may consider necessary.

Travellers and guides are free to agree amongst themselves as to the payment to be made to the latter for their services, but in the absence of such special agreement, payment is fixed by tariff, and the charges are in no case to exceed the sums there set down.

The following are the chief items in the Tariff:—

Mont Blanc	100 francs
Grand Plateau	50 "
Grands Mulets, returning next day	40 "
Do. returning same day	20 "
Pierre de l'Échelle	10 "
Mer de Glace, going and returning by Montanvers	6 "
Mer de Glace, going or returning by the Chapeau	10 "
Jardin, going and returning by Montanvers	12 "
Jardin, returning by the Chapeau	14 "
Tour by Montanvers and the Aiguilles to the Pierre de l'Échelle	15 "
Col du Géant, descending to Courmayeur	50 "
Flegère, or Plan Praz	6 "
Do. do., if both are combined in one day	10 "
Brévent	8 "
Summit of the Buet, returning same day	15 "
Do. do. returning next day	20 "
Do. do. descending to Sixt, and returning by Col d'Anterne	29 "
To Martigny by Tête Noire, or Col de Balme, returning the next day	12 "
Ditto, if the traveller descend from the Col to the Tête Noire	15 "
Do. if the traveller visit the falls of Poyaz or Barberine, additional for each fall	1 "
To Col de Balme and Tête Noire, returning same day to Chamouni	9 "
To the Source de l'Arveiron, Glacier des Bossons, or Cascade du Dard	3 "
For each, if in addition to another excursion	1.50 "
To Sixt, by Col d'Anterne	9 "
Do. returning by same route, or by Champéry and Martigny, per day	9 "
To Courmayeur by Contamines, in three days	18 "
Do. do. in two days	15 "
Ascent of the Cramont	6 "
Courmayeur to Great St. Bernard, or to Orsières	9 "

Charge for guide's return from
Martigny to Chamouni . . . 6 francs

The same daily charge is made for the guide's
return when discharged at a distance from
Chamouni.

As a general rule, where the way is practicable for mules, the charge for each mule is the same as for a guide.

The excursions made from Chamouni are very numerous, varying with the tastes and physical strength of visitors; but they fall into two principal divisions, according as the object is to approach the great glaciers and peaks of the central range, or to seek a more general view from some point in the range of the Aiguilles Rouges on the N. side of the valley.

The chief aim of the first class of excursions is the *Mer de Glace*. It has been said in the introduction, that the mass of Mont Blanc consists of two parallel ridges, of which the northern is broken by several wide gaps through which the snows accumulated in the valleys between the two ridges are drained through great glaciers that descend towards the valley of Chamouni. The *Glacier des Bois*, called in its middle region *Mer de Glace*, is the most important of these glaciers, from the extent of the area which it drains. Without speaking of minor tributaries, it receives the overflow of three great reservoirs. The most considerable of these is the *Glacier du Géant*, also called de Tacul, which descends on the E. side of the central mass of Mont Blanc between a double range of Aiguilles. In the opposite direction, a reservoir lying between the *Aiguille Verte* and the *Aiguille de Triolet* pours down to the W. an ice-stream called *Glacier de Talèfre*, and before reaching the rocks of the Tacul receives from the S. the *Glacier de Léchaud*. The central point where these three ice-streams meet opposite to the Tacul bears the same relation to the adjoining ridges as Entrèves in the Allée Blanche. Here the drainage of the whole basin is carried off to the N. in a broad channel, which henceforward bears the name *Mer de Glace*,

till about 4 m. lower down it falls over steep rocks in an ice-cataract, to the level of the valley, where it comes to an end, about 3 m. from the village of Chamouni.

1. *Source of the Arveiron*. Those who have two or three hours to spare, especially if they have not previously seen the lower end of a great glacier, do well to visit the spot where the stream of the *Arveiron*, one of the sources of the Arve, issues from the extremity of the *Glacier des Bois*. This is about 3 m. from Chamouni, and is approached by a char-road, which passes by the hamlets des Praz and des Bois. Between them the remains of a great moraine, now overgrown with pine-trees, deserve examination, and the *Aiguille du Dru*, seen towering above, is a magnificent object. As explained in the introduction (Art. Glaciers) the form and position of the lower end of the glacier are subject to continual change. The stream usually issues from a cavern in the ice of variable depth, and from 30 to 40 ft. in height, whose strange aspect and exquisite colour often tempted strangers to penetrate some distance into it, and several fatal accidents have happened from the sudden fall of blocks of ice from the roof. Of late years, however, the stream has commonly escaped from beneath the ice at a considerable height above the end of the glacier, forming a waterfall visible from Chamouni.

This excursion is often combined with that to the Montanvers or the Flegère. There is a little inn (Au Touriste) near the glacier.

2. *The Montanvers*. The rocks near to the ice-cataract of the *Glacier des Bois* being very steep, the most convenient way for reaching the middle region of the glacier is to mount from Chamouni by a good mule-path, winding up the slope of the valley towards a promontory extending from the base of the *Aiguille de Charmoz*, which forms the W. barrier of the *Mer de Glace*. After crossing some meadows, the path ascends through a forest, and

if the visitor has no intention of going beyond the Pavillon, a guide is quite unnecessary. The mules take $2\frac{1}{2}$ hrs. in the ascent—2 hrs. more than suffice to a good walker. Above half way the tracks of avalanches, which have destroyed much of the forest, are frequently passed; but nervous persons may feel assured that there is no danger from that quarter in the tourist season. In approaching the summit the *Aiguille du Dru* becomes a more and more impressive object, but no other conspicuous peak is seen, until on reaching the summit of the rounded ridge of the *Montanvers*, and losing sight of the main valley below, the traveller suddenly gains that wonderful view which has sufficed to attract and to reward thousands of visitors from every part of the world. No amount of familiarity, nor even the rivalry of scenes less accessible and not less grand, can much lessen the impression which this makes upon all true lovers of nature. The first object that attracts attention is the *Mer de Glace*, so often described in vain, for description gives no real image of the reality. Of the magnificent group of aiguilles that rise on the opposite bank, that of *Dru* (12,500'), pre-eminent for boldness of form, almost conceals the much higher peak of the *Aiguille Verte* (13,432'), which lies behind it. To the rt. extends the shattered ridge whose most prominent point is the *Aiguille du Moine* (11,109'). At the end of the vista, at least twice as distant as the *Moine*, the eye reaches the *Grandes Jorasses* (13,496'), one of the giants of the S. ridge of the Mont Blanc range, rising at the farther end of the S. branch of the *Glacier de Léchaud*. This glacier is bounded to the W. by a ridge projecting towards the spectator, whose N. extremity is the *Aiguille de Tacul*, also called *Les Périades* (11,013'). To the rt. the summit of the *Aiguille du Géant* (13,099') is seen, and then the nearer mass of the *Aiguille de Charmoz* (10,951') cuts off the view in that direction.

The house which is the ordinary rendezvous of tourists on the *Montanvers* is called the Pavillon; it is rented by one of the *Couttets*, and contains a collection of minerals, cut crystals, and other objects, for sale. During the day it is often thronged with visitors, who seek rest and refreshment, but in the evening all subsides into quiet, and it then becomes a pleasant stopping-place for a mountaineer who can be content with tolerable fare and beds, four or five of which are kept to accommodate tourists who often sleep here before visiting the *Jardin* or crossing the *Col du Géant*. Most strangers descend from the Pavillon to the bank of the glacier, and go some short distance upon its surface. Unemployed guides are usually on the spot ready to offer their services, and the tourist who has no previous acquaintance with glacier travelling, and who may have come from *Chamouni* without a guide, will do wisely to accept the escort. The traveller who has followed the progress of the *Glacier Theory* during the last 25 years, will recollect that he here stands upon classic ground, and that much of our present knowledge of the laws and causes of glacier motion is due to the observations made on the *Mer de Glace* by our eminent countrymen, *Principal Forbes* and *Professor Tyndall*. After visiting the *Montanvers*, and setting foot upon the *Mer de Glace*, the less strong or adventurous tourists return to *Chamouni*, and some descend by a steep path, where a guide is expedient, to the source of the *Arveiron*, while those who can do so without over-fatigue wisely decide to combine this with the following excursion, by crossing the *Mer de Glace* opposite the Pavillon. In the latter part of the season, when the crevasses are much enlarged, this is sometimes rather difficult. None but persons thoroughly used to ice-travelling should attempt to go alone, and as a general rule a guide should be taken for each traveller. Those engaged at the *Mont-*

anvers are entitled to 2fr. for crossing the glacier, and 4fr. if they descend to the Chapeau.

3. *The Chapeau.* The steepness of the rocks on the W., or Montanvers side, makes it impossible to approach near to the ice cascade of the Glacier des Bois. The opposite bank of the glacier, although steep, is traversed by a path which leads up to the very base of the Aiguille du Dru, and it is thus possible to approach close to the towers and pinnacles of ice formed by the action of the sun where the glacier is riven into deep and frequent crevasses. To complete the impression of a glacier gained by a visit to the Mer de Glace, it is necessary to see near at hand its utterly different aspect in the wild confusion of the ice-fall. To reach the Chapeau from Chamouni it is necessary to follow for 1 hr. the char-road to Argentière, till, beyond the village of *Tines*, a mule-path turns up to the rt., passes the hamlet of *Lananchy*, and approaches the rt. bank of the glacier. The mules are left before a short and steep ascent, leading in about 1 hr. more to a cavern or recess in the face of the rocks, perhaps a finer point of view than the *Chapeau*, which is, properly speaking, the name of a grassy knoll above the cavern. This point is considerably lower than the Montanvers, and the view of the Mer de Glace is not nearly so complete, though the Aiguilles de Charmoz, de Greppond, and de Blaitière, seen on the opposite side of the glacier, and backed by the still mightier central mass of Mont Blanc, form the materials of a grand picture. The special object of attraction is, however, the ice-fall of the glacier, which lies immediately below the eye, and the effect of the fantastic forms assumed by the ice is often increased in a startling manner by the fall of some huge mass, weighing many tons. The path leading from the Chapeau to the base of the Aiguille du Dru passes by a rough staircase along a face of rock, and

formerly deserved the name Mauvais Pas. But it has been so much improved, and made easy by a rope stretched so as to serve as a bannister, that ladies pass without difficulty. About $\frac{1}{2}$ hr. above the Chapeau the traveller reaches the point from whence he may cross the glacier to the Montanvers. It is a better arrangement to visit the Montanvers first, and then cross to the Chapeau, so as to descend, instead of ascending, by the steep path on the E. bank of the glacier. This path, especially the staircase of the Mauvais Pas, is not practicable for cattle, and it is therefore necessary to drive the cows that are annually sent to feed on the Alpine pasture at the base of the Aiguille du Dru across the Mer de Glace. This is a curious operation, and well worth seeing. A large number of men, boys, and girls are employed, carrying axes to level the ice, planks to bridge over crevasses, and ropes to keep the cattle from slipping.

4. *The Jardin.* It has been already said, that the easternmost of the three glacier streams which form the Mer de Glace is the Glacier de Talèfre, originating in a great reservoir of névé between the Aiguille Verte and the Aiguille de Triolet. In the midst of the névé-basin rises a mass of rock, clear of snow in fine weather, nearly a mile in length by 300 or 400 yards in breadth, whereon grow many species of flowering plants. This spot received, in the local patois, the name Courtil, which has been supplanted by the French equivalent Jardin. Those familiar with the higher region of the Alps know that there is nothing unusual in the existence of an island of rock in the midst of fields of névé, nor in the presence of Alpine flowers on such islands, even above the height of 10,000 ft.; but apart from any fancied interest attaching to a garden in the midst of eternal snows, the position of the Jardin fully justifies the reputation it has acquired as one of the most

interesting spots within reach of Chamouni. The distance being rather considerable, and the objects of interest very numerous, it is a good plan, even for those who do not fear fatigue, to sleep at the Pavillon on the Montanvers, thus leaving time to take the expedition leisurely, and to explore some of the upper recesses of the Mer de Glace. Starting from the Montanvers, the excursion is quite within the range of many ladies, and as in fine weather it is unaccompanied by the slightest risk, it may safely be recommended to them as one of the most interesting of easily practicable glacier excursions. An active pedestrian may make the whole expedition from Chamouni in $10\frac{1}{2}$ or 11 hrs., exclusive of halts. Those not already well acquainted with the glacier should on no account attempt to go without a guide, and one should be engaged for each lady or other visitor unused to glacier-travelling.

Although it is possible to approach the Jardin by the Chapeau, and thence along the E. bank of the glacier, in part by the moraine, and in part over the ice, to the Couvercle, that way is very rarely taken, the almost universal route being by the Montanvers. From thence a path is carried along the slope above the glacier, and the first so-called difficulty, which can be so only to the veriest beginners in mountain walking, is at a place called Les Ponts, where the path is carried along the face of steep rocks. It was formerly usual to descend to the moraine a short distance beyond Les Ponts, but a better way is now followed, which keeps for about $1\frac{1}{4}$ hr. along the rocky base of the Aiguille de Charmoz to *Trélaporte*, where it is usually possible to get upon the ice with less difficulty than lower down. It should, however, be remembered that the condition of the glacier and the form and width of the crevasses are subject to continual variation, which is most rapid in fine weather; and it is necessary to rely on the knowledge and

experience of the guides, who by constant practice are able to follow the changing phases of the ice.

Above Trélaporte is a remarkable point of view from a notch in the face of the Aiguille de Charmoz, which is known as the Cleft Station. The ascent is decidedly difficult, and should be attempted only by practised cragmen, and with a trusty guide. Readers of Professor Forbes's 'Travels' will not forget the extraordinary escape of an American tourist who attempted alone to climb these dangerous slopes.

From Trélaporte it is necessary to traverse the glacier diagonally below the junction of the Glacier de Léchaud with the Glacier du Géant. In the way the traveller crosses four medial moraines, corresponding to as many points of junction between the separate ice-streams that make up the Mer de Glace, and by a slight detour, either in going or returning, he may inspect one of the Moulins, which are amongst the most curious of glacier phenomena. (See Introduction, Art. Glaciers.)

As the traveller approaches the Glacier de Léchaud, he finds, on turning round, that he has reached a point opposite the ice-fall of the Glacier du Géant, descending from the great central valley of the Mont Blanc range. The highest peak of the mountain, and the adjoining mass of the Mont Blanc de Tacul, remain almost constantly in view during the remainder of the excursion. Advancing along the Glacier de Léchaud, it is soon seen that this is formed by the union of one branch, from the N. base of the Grandes Jorasses and the adjoining peaks, with the Glacier de Talèfre, issuing from a narrow opening to the E., and forming one of the finest ice-cataracts in the Alps before it reaches the level of the main Glacier de Léchaud. To gain the upper level of the Glacier de Talèfre, which is the object of this excursion, it is necessary to climb the rocks of the *Couvercle* on the N. side of the Glacier de Léchaud, at the base of the *Aiguille de Talèfre*. The spot

where it is usual to scramble up the face of the granite rock, is called *Les Égralets*, and although steep, presents no real difficulty, as there is good holding for feet and hands. After this the way becomes much easier, the path lies in part over slopes of turf covered with Alpine flowers, and in part amid blocks of stone and débris. It is usual to make a halt here at a spot where the view is as striking as that from the *Jardin*, before crossing the arm of the glacier, which separates the rock from the shore.

The ideas excited by the name *Jardin* may at first cause some disappointment. It is, in fact, a steep rock, and in great part bare, though here and there Alpine flowers bloom luxuriantly during the short summer, often not more than six weeks, when the surface is clear of snow, the lower part being 9,042 ft., and the summit 9,893 ft. above the sea. What is really impressive here is the position of this patch of rock in the midst of a world that has so little in common with ordinary experience. The mountaineer who is used to roam in the upper region of the Alps, may often find himself in some similar solitude, entirely cut off from the lower inhabited world, where nothing but ice, snow, and rocks meet the eye; but rarely can he see this strange region on so great a scale, and so completely isolated as here. The distance in a direct line to the summit of *Mont Blanc* is about 9 m., and throughout that distance, and on either side, there is no spot that exhibits traces of life, animal or vegetable. The tokens of destruction, the fall of rocks or of blocks of ice, or the gentler murmur of the rivulets that flow from the melting snow, and by their unceasing energy complete the process of decay, are the only witnesses to the presence of living force in this wilderness. The ridge NE. of the *Jardin*, extending from the *Aiguille Verte* to the *Aiguille de Triolet*, one of the massive beams in the architecture of the *Mont Blanc* range, is called *Les*

Courtes, and its formidably steep slopes are often sought by crystal hunters.

In returning from the *Jardin*, if the day be not too far advanced, there is time to visit the *Lac du Tacul*. This lies at the base of the *Aiguille du Tacul*, and is formed during summer by the snow-water accumulated in the space enclosed between the rock and the glacier. This central point of the glacier system has been resorted to for a night bivouac by Forbes, Tyndall, and other explorers, and an interesting account of a night passed there is given in Mr. Wills's 'Wanderings among the High Alps.'

5. *Les Aiguilles de Chamouni*. Five summits, all visible from Chamouni, overlook the middle portion of the valley, and separate it from the parallel snow-valley of the *Glacier du Géant*. Reckoning from E. to W., these are the *Aiguille de Charmoz* (10,951'), *A. de Grepond* (12,044'), *A. de Blaitière* (12,097'), *A. du Plan* (11,689'), and, lastly, the *Aiguille du Midi* (12,822'). Several small glaciers descend in the hollows at the N. base of this range, besides one more considerable, the *Glacier des Pélerins*. An excursion now frequently made is to pass along the base of the *Aiguilles*, either traversing the glaciers, or passing below them, and descending by the *Glacier des Pélerins*, and along a new path which has been made to facilitate the excursion. To a mountaineer this is an easy and very interesting expedition, and it is not too much for some enterprising ladies, who may ride a portion of the way. It may very conveniently be made from the *Montanvers*, and is often combined as a second day's walk after that of the *Jardin* by those who pass the night at the *Pavillon*. A guide is necessary. Immediately above the village of Chamouni, and just on a level with the *Montanvers*, are the *Châlets* of *Blaitière Dessus*, which may be reached by mule-path in $1\frac{3}{4}$ hr. from Chamouni, or in about 1 hr. from the *Montanvers*. Thence the mule-path is carried for about $\frac{3}{4}$ hr. past the lower end of the

Glacier de Nantillon, to the *Lac Du Plan*. From the lake it is not difficult to reach the very base of the *Aiguille du Plan*, and even to ascend some way up the steep rocks. Mr. Wills recommends those who make this excursion from the *Montanvers* to traverse the glaciers of *Blaitière* and *Nantillon* in preference to passing below them, the latter way involving some risk from blocks of stone that fall during the heat of the day. The views throughout this excursion are varied and grand. Some travellers, instead of descending direct to *Chamouni*, lengthen the excursion by reaching the *Pierre de l'Échelle* at the NW. base of the *Aiguille du Midi*. (See *Rte. G.*)

6. *The Glacier des Bossons and Cascade du Dard*. The *Glacier des Bossons*, which descends directly in one stream, without medial moraines, from the upper part of *Mont Blanc* to the valley of *Chamouni*, does not drain nearly so extensive an area as the *Mer de Glace*, neither does it exhibit so fully the various aspects of glacier existence. It is necessarily traversed by those who go from *Chamouni* to the *Grands Mulets*, and its lower extremity where it reaches the level of the valley is often made the object of a short excursion from the village, and, taken together with the pretty *Cascade du Dard*, suffices for a pleasant afternoon's stroll. Both may, by a slight detour, be taken by a pedestrian in his way through the valley between the *Prieuré* and *Les Ouches*. The end of the *Glacier des Bossons* reaches the valley about 4 m. below *Chamouni*, and may be reached by the road or by a path along the S. side of the *Arve*. The ice is broken up into pinnacles of great beauty—often more than 150 ft. in height, which may be approached very nearly. They are best seen on the W. side of the glacier, and instead of returning by the same way, it is easy to cross the glacier in a place where it is free from crevasses.

It is a walk of but 15 min. from the E. bank of the glacier to the hamlet des *Pélerins*, a short distance below the

Cascade des Pélerins, formerly much visited as one of the most beautiful and graceful of waterfalls. The torrent, descending in a single bound, struck a projecting mass of rock, and sprung out anew with fresh vigour in the fashion which is imitated on a petty scale by some artificial fountains. The fall of some mass from above broke the projecting rock, and spoiled the waterfall. Within a few hundred yards, and nearer to *Chamouni*, is the *Cascade du Dard*, very picturesque, and better worth seeing than the *Pélerins* in its present condition. Near at hand is a chalet, where bread and butter, strawberries and cream, cheese and wine, with crystals and scraps of minerals, are kept on sale to tempt visitors. Anyone used to mountain walking may find the way back to *Chamouni*, but it is possible to go astray.

The excursion to the *Grands Mulets* is described in *Rte. F.*, and the *Glaciers du Tour* and *d'Argentière* are noticed in *Rtes. L. and M.* The *Col de Balme* and the *Col de Voza*, both well worth a visit, even by those who may have no occasion to traverse them, will be found in *Rtes. B. and H.*

We now notice the two excursions most frequently made on the side of the valley of *Chamouni* opposite to the range of *Mont Blanc*.

7. *The Flegère*. This is a very easy excursion, involving an ascent of $2\frac{1}{2}$ hrs. by a good mule-path, and a descent which is easily accomplished in 2 hrs. It is very often made by ladies. A guide is not necessary to a pedestrian. Near the hamlet of *Les Praz*, and just opposite to the lower end of the *Glacier des Bois*, the path turns to the l. from the char-road at the base of the *Aiguille de Charlanoz*, one of the *Aiguilles Rouges*. The ascent lies at first through a ravine, and then amidst pine forest to an open pasture called *Praz Viola*. From thence 1 hr., for the most part through a forest composed of pine and larch, suffices to reach the *Croix de Flegère* (6,260'), commanding a general view of the *Mont Blanc* range, and the whole length of the

valley from the Côt de Balme to the Col de Voza. Being exactly opposite to the Mer de Glace, the cluster of pinnacles whose highest summit is the Aiguille Verte is seen to greater perfection than from any other easily accessible spot near Chamouni. Close to the Flegère is a chalet where refreshments are kept ready for visitors, and where one or two beds may be obtained by travellers desiring to explore the range of the Aiguilles Rouges. From hence the *Aiguille de la Glière*, one of the summits of that range, may be reached in 4 (?) hrs. The height is about 8,800 ft., and the view is said to be more extensive than that from the Brévent, but it is not so well placed for a view of the central mass of Mont Blanc. It is quite possible to combine a visit to the Flegère with the ascent of the Brévent, but unless a proposed new mule-path should be completed, this is not much to be recommended. The path was extremely rough and laborious, and scarcely to be found without a guide—the distance about 3 hrs.

8. *The Brévent.* The SW. end of the range of the Aiguilles Rouges is formed by the ridge of the Brévent. The summit, standing just opposite to the Glacier des Bossons offers the very finest view of the N. side of Mont Blanc; and in favourable weather is one of the most interesting, some think the most interesting, excursion to be made from Chamouni. To those not well used to mountain walking, it is a somewhat laborious day's work of 8 hrs., exclusive of halts, but it is nevertheless often achieved by ladies, who may ride for two-thirds of the way. None but practised mountaineers should go without a guide. Although rounded at the top, and sloping gently to the N. and NW., the side of the Brévent facing Chamouni is a precipice almost completely vertical, and the most direct way to reach the summit is by the ridge to the E. of the summit. The ascent commences immediately from the Prieuré. The mule-path, after traversing some open fields and pastures, mounts the

steep slope of the mountain by zigzags, in part through forest, at intervals over open spaces that have been cleared by avalanches and landslips. After reaching the upper limit of trees, the path leads to a gently sloping green pasture, called *Planpraz*, where stands a little mountain inn at which many halt for refreshment, and where it is necessary to leave the mules. This spot, 6,959 ft. in height, commands a magnificent view, superior to that from the Flegère, and not much inferior to that gained from the summit, and is well worth a visit by those who are unable to go farther. Mules take about 3 hrs. to reach Planpraz, but a pedestrian, following a more direct path which lies in great part over slopes of débris, or cutting off some of the zigzags of the mule-track, may make the ascent in $2\frac{1}{2}$ hrs., or even less. From Planpraz a rocky path passes round a projecting ridge of the mountain and enters a stony hollow, leading in about 1 hr. to the base of a very steep wall of rock, traversed by a fissure or chimney about 50 ft. in height, which must be climbed to reach the upper ridge of the mountain. Though the rock gives good hold for feet and hands, this is too steep to be convenient to ladies, and they usually avoid the difficulty by a circuitous path, longer by 15 or 20 min., which joins the other near the top of the Cheminée. From thence a gentle ascent of less than $\frac{1}{2}$ hr. leads to the summit, 8,330 ft. above the sea.

Amongst the numerous objects that attract attention, the peak of Mont Blanc is prominent. Those who have read with eager interest the narratives of the ascent are anxious to follow, as they here can do, the whole course of the ordinary route from the Pierre de l'Échelle to the summit, and they can at the same time study the upper part of the so-called St. Gervais route from the Aiguille du Goûté to the top. After satiating the eye with the contemplation of the snowy range opposite, the traveller should not omit to examine the remainder of the panorama. The most prominent object to

the N. is the Buet, a flattened glacier-clad pyramid; more to the E., looking across the deep gorge of the Dioza, is the Col d'Anterne, leading to Sixt, followed by the range of the Rochers des Fys, crowned by the Pointe de Salles (10,333'), the whole mass appearing—as it is in truth—a gigantic ruin, on which the short period of human history has worked notable change in undermining many of its highest towers and battlements. To the SW., above the mountains of Beaufort, one of the peaks of the Pelvoux group is seen in the far distance, and comparatively near at hand the Mont Joli, a rival of the Brévent (§ 12, Rte. A), rises beyond the Col de Voza.

A variety of routes may be taken to or from the Brévent. Those who intend ascending the Buet may go to the Châlet de Villy, about $3\frac{1}{2}$ hrs., where they may pass the night. If the day be not too far advanced, an active walker may reach Sixt by the Col d'Anterne (§ 17, Rte. C) in $8\frac{1}{2}$ hrs. An easier course is to descend to Servoz by the gorge of the Dioza, 3 hrs.' walk, and thence either return to Chamouni, or follow the road to Sallanches. A circuitous but interesting way, often taken in returning from the summit, passes by the Lac du Brévent, and winds round the western slopes of the mountain till it reaches the high-road at Les Ouches, in 4 hrs. from the summit. For all the above-mentioned routes, but especially to find the way from the Brévent to the Col d'Anterne, it is expedient to take a guide. In the writer's opinion, it is a better arrangement to gain the summit of the Brévent (if possible, early in the day) by any of the above routes, and to descend to Chamouni, following the ordinary path by Planpraz. The traveller thus has the view of Mont Blanc before him throughout the descent, and avoids the heat of the sun, which is often inconvenient in the direct ascent from Chamouni. Thus a pedestrian approaching from Geneva may sleep at Servoz, and take the Brévent on his way to Chamouni, or, better still, if starting

from Sixt, and favoured by fine weather, he may reach the Brévent by the Col d'Anterne, $9\frac{1}{2}$ hrs.—exclusive of halts—enjoy the marvellous evening view of Mont Blanc lit up by the sun in the western sky; and if he should have the further good fortune to conclude the descent by moonlight, when the valley of Chamouni is seen to its utmost perfection, he will have enjoyed a day which cannot easily be surpassed for grandeur and variety.

The ascent of the Buet, though it may count as one of the excursions to be made from Chamouni, is included in § 17, Rte. D.

In the neighbourhood of Chamouni the botanist may gather most of the characteristic species of the Alpine region that grow on the detritus of granitic rocks, but the flora is much less rich than in the valleys of Monte Rosa, where the rocks vary more in mineral composition. The Brévent offers rather more variety than the slopes surrounding the glaciers of Mont Blanc. To the geologist the valley of the Dioza is interesting from the fossil remains which abound on its N. slopes. The anthracite deposits of Coupéau, about 40 min. above Les Ouches, also deserve a visit.

ROUTE B.

CHAMOUNI TO COURMAYEUR, BY THE COL DU BONHOMME.

	Hrs. walking	Eng. miles
Les Ouches . . .	$1\frac{1}{4}$	5
Col de Voza . . .	2	5
Contamines . . .	3	8
Nant Bourrant . . .	$1\frac{3}{4}$	$4\frac{1}{2}$
Col du Bonhomme . . .	$3\frac{1}{4}$	$8\frac{1}{4}$
Chapiu . . .	$1\frac{3}{4}$	$4\frac{1}{2}$
Motet . . .	2	5
Col de la Seigne . . .	$1\frac{3}{4}$	$3\frac{3}{4}$
Courmayeur . . .	$4\frac{1}{4}$	12
	<hr/> 21 $\frac{1}{4}$	<hr/> 56

Practicable for mules, and frequently made by ladies, who usually sleep at Contamines and Chapiu, making the journey in 3 days. Active pedestrians who sleep at Nant Bourrant usually

take the rte. by the Col des Fours to Motet, 1 hr. shorter than the way by Chapiu, and reach Courmayeur in 11 hrs.' steady walking, exclusive of halts.

This route forms the most frequented portion of the tour of Mont Blanc, an expedition often made by visitors to Chamouni. Adventurous mountaineers now-a-days often prefer one or other of the glacier passes described in this section; but the view from the Col de la Seigne, and the descent from thence through the Allée Blanche, will always make that part of the present route attractive to the true lover of nature. Except in the most settled weather it is imprudent, even in an experienced mountaineer, to go without a guide. In the event of clouds descending upon the Bonhomme, it is almost impossible for anyone not possessing minute local knowledge to find the true way; and even in clear weather it is easy to go astray. It is far better to make the rte. in the direction here indicated rather than in the opposite sense, from Courmayeur to Chamouni.

From Les Ouches, on the road to Sallanches, 5 m. below the Prieuré, a rough mule-path mounts rather steeply to the SW., and, after passing several chalets, attains the summit of the *Col de Voza* (5,938'), a depression in the ridge which extends from the base of the Aiguille du Goûté, between the valley of Chamouni and that of Montjoie. Nearly $2\frac{1}{2}$ hrs. are required for the ascent, while $1\frac{1}{2}$ hr. suffices to descend to Les Ouches. The Col lies between the *Mont Lachat* to the SE., and the *Prarion* (6,857') to the N. If time can be spared, it is worth while to make a detour to the latter point, which commands a still finer view. A small inn—Pavillon de Bellevue—has been built on the slope of the Mont Lachat, in a fold of the ridge parallel to, but considerably higher than, the Col de Voza. The height of the inn, according to Joanne, is 6,933 ft. It supplies food and tolerable beds, but the charges are extortionate, and it is advisable to fix prices beforehand. The view of

the valley of Chamouni and the Mont Blanc range is a counterpart to that from the Col de Balme (Rte. H), but not quite so favourable, as the Dôme du Goûté conceals the highest part of the mountain. The descent towards the Val de Montjoie lies along the steep ridge of the Mont Lachat, which forms the N. boundary of the fine *Glacier de Bionnassay*. In front the view is bounded by the Mont Joli, with the church of St. Nicolas de Verece at its base, and to the l. the ridge extending from the *Aiguille de Bionnassay* to the *Aiguille de Tricot* on the opposite side of the glacier is the most conspicuous object in view. The mule-path descends by *Bionnassay*, and thence along the rt. bank of the torrent to *Bionnay*, in the Val de Montjoie, $1\frac{3}{4}$ hr. from the Col de Voza, where it joins the main track from St. Gervais to the Col du Bonhomme. The way from Sallanches to Bionnay is described in Rte. C. It is an easy walk of $1\frac{1}{4}$ hr. from Bionnay to *Contamines* (Inns: Union, good; H. du Bonhomme), the best stopping-place on this rte., but too near Chamouni for those who wish to make it in two days. A pedestrian may save $\frac{1}{4}$ hr. by taking a path to the l. in descending from the Col de Voza a little before reaching Bionnassay, and crossing the torrent by a wooden bridge a little below the spot where it issues from the glacier. From thence a path lies chiefly across meadows to *Champel*, and joins the main track to Contamines at the hamlet of Tresse. By this way Contamines is reached in $2\frac{1}{2}$ hrs. from the Pavillon de Bellevue. Contamines (3,865') lies at the W. base of the Mont Joli (§ 12, Rte. A), which may be reached from hence, and will be more often visited when it is known to be a worthy rival of the Brévent and the Cramont. In the opposite direction the *Glacier d'Armencettes*, lying in a grand amphitheatre crowned by the Aiguille de Miage and the Aiguille de Berenger, has been somewhat neglected by the explorers of this district. For the way to Courmayeur by the Col de Trélatête,

a course strongly recommended to mountaineers, see Rte. D.

Half a m. beyond Contamines a path descends to the rt., to the Sanctuary of Notre Dame de la Gorge, frequented in August by many pilgrims; while the main track keeps to the rt. bank of the *Bonnant*, or Bon Nant, and after mounting a steep and rough slope of the valley, crosses the torrent by a stone bridge, and, traversing an Alpine pasture, reaches the châteaux of *Nant Bourrant* (4,560'). There is here a little mountain inn, not uncomfortable, but there have been complaints of extortion. It is the common halting-place for those who make the journey in two days. There is a fine fall of the Bonnant below the bridge which is crossed to reach the châteaux, and a still finer one rather higher on the branch of that stream coming from the glacier of Trélatête, which is in sight of the châteaux. (See Rte. D.)

Above Nant Bourrant the path to the Col du Bonhomme traverses a wood before reaching the hamlet of *La Barmaz*, where a tired traveller may find a bed for the night. From hence a path mounts W. to the Enclave de la Fenêtre, a path which leads to St. Maxime de Beaufort by the valley of Haute Luce (§ 12, Rte. E). Here the massive tower of rock called the *Tête du Bonhomme* (10,138') comes into view, and to the l. the similar but rather lower summit called La Femme du Bonhomme (9,908'). The track now mounts through a narrow strait in the valley, and then, passing some vast moraines of ancient glaciers, ascends amidst débris to an open space where, near a little lake (5,892'), stand the châteaux of *Mont Jovet*, 1½ hr. from Nant Bourrant. Bread, milk, wine, and two or three beds may be had here, and some prefer this as a stopping-place on the way to Courmayeur, but the provision for travellers is scanty. Having now passed beyond the region of tree vegetation, the valley assumes a wilder and sterner aspect. A short but steep ascent leads to another step in

the valley, a plateau called *Plan des Dames* (6,523'), where a large pile of stones marks a spot consecrated by a vague popular tradition that tells of a great lady and her suite who all perished here in a snow-storm. Another ascent, longer than the last, leads in about 40 min. to what appears to be the desired col; but on reaching the summit, which lies between the Tête du Bonhomme and the Aiguille de Rousselette (9,843'), it is seen that the pass which does in truth lie between those summits turns sharply to the W., and descends through the Vallon de la Gitta to St. Maxime de Beaufort (§ 12, Rte. F). It is still a distance of 1 hr. across barren stony slopes, usually flecked with patches of snow, to the true pass. This portion of the rte. is much exposed to storms, and except in the most settled weather it is highly imprudent to pass without a guide. The fate of two Englishmen who perished here in a snow-storm in September 1830, is still quoted as a warning to travellers.

The *Col du Bonhomme* (8,195', Forbes), marked by a large cross, is the watershed between the basin of the Arve and that of the Isère. The view is not so extensive as might be expected, but the fine peak of the Mont Pourri and some more distant summits at the head of the valley of the Isère compensate the traveller for the absence of the Mont Blanc range, shut out by the heights to the l. of the Col. To pass from the Col du Bonhomme to the Allée Blanche is not so short and easy an operation as it appears to be upon the map. The gorge which lies at the S. side descends by Bonneval to Bourg St. Maurice (§ 12, Rte. F), but rather more than 3,000 ft. below the Col, at the poor hamlet of Chapiu, it is joined at an acute angle by the stream which flows to the Isère from the W. side of the Col de la Seigne. The mule-track descends to *Chapiu* (4,974'), where there are two poor inns — H. du Soleil, improved; and Repos des Voyageurs — and then reascends to Motet

(6,004') through a barren and dreary glen, the least interesting part of the entire route. The pedestrian may choose between this and a shorter but rather steeper and rougher way over the ridge that separates the two torrents which meet at Chapiu. The most direct way lies to the S. of the Cime des Fours (12,615') by the *Col des Fours*, (8,892'), reached by a path mounting to the l. from the *Col du Bonhomme*. The descent thence to Motet is rather steep and fatiguing, but in fine weather it is much to be preferred, being shorter by 1 hr. than the mule-path by Chapiu. There is a little-used path intermediate between the two already mentioned, which crosses the ridge at a point lower than the *Col des Fours*, and joins the track from Chapiu at a group of chalets called Hameau du Glacier, $\frac{1}{2}$ hr. below Motet, where all these paths converge. There are two chalets, or rather mountain inns, at Motet, tolerably clean, but provisions are more scanty than at Chapiu.

Ascending steadily for $1\frac{1}{2}$ hr. from Motet, the traveller reaches the summit of the *Col de la Seigne* (8,301'), and here the fatiguing and not very interesting way that has been toiled over for the preceding 5 or 6 hrs. is rewarded by a view of extraordinary grandeur along the S. side of the range of Mont Blanc. The Piedmontese counterpart of the valley of Chamouni is undoubtedly more imposing and more impressive than its Savoyard rival. It has been remarked in the introduction to this section, that the Mont Blanc range consists, in fact, of a double ridge of peaks, of which the S. ridge is by far the most continuous, and includes besides the actual summit most of the highest secondary peaks. The colossal range which extends for 18 m. from the *Col de la Seigne* has been traversed only at two points, even by those adventurous explorers who have pushed their attempts to devise new ascents and passes to the verge of temerity, and but one of these points—the *Col de Miage* (Rte. E)—can be considered as

a break in the continuity of the ridge. To the left of the spectator three peaks follow each other in rapid succession. Nearest is the *Aiguille du Glacier* (12,011'), then the *Aiguille de l'Allée Blanche*, and beyond it the *Aiguille de Trélatête* (13,845'?). The latter is followed by the wide opening through which the Glacier de Miage descends into the valley, and then the eye rests on the central mass of Mont Blanc, here seen as a dome of snow sustained by three enormous buttresses of rock. The nearest and loftiest of these is the *Mont Broglia*, beyond this is the *Mont Rouge*, and the third is the *Mont Péteret*, a granite pinnacle of the boldest form, somewhat more detached than the others from the main mass, and which remains prominent as one of the most striking objects in view throughout the descent to Courmayeur. Among the more distant summits of the range the *Aiguille du Géant* and the *Grandes Jorasses* are prominent. At the end of the long vista is the *Col de Ferrex*, and beyond it rise the snowy peaks of the *Vélan* and the *Grand Combin*. To the rt. the ranges of the *Cramont* and the *Mont de la Saxe*, broken by the gap through which the Dora escapes towards the SE., run parallel to the great range of Mont Blanc. The valley between these ranges, whose whole length now extends beneath the traveller's feet, is properly called *La Lex Blanche*; but it seems now impossible to change the received spelling adopted by modern writers in ignorance of the true etymology, and the name *Allée Blanche* is applied to the whole, although the portion which descends from the *Col de Ferrex* to *Entrèves* is also known by the name *Val Ferrex*, as well as that which from the opposite side of the *Col* descends to *Orsières*.

In descending from the *Col de la Seigne* several rare plants may be gathered, and amongst others *Ranunculus parnassifolius*. Lower down *Hugueninia tanacetifolia* and *Achillea macrophylla* are rather common. About 1 hr. below the *Col* are the highest

châlets (6,595'), where milk may be obtained. Having left behind on the l. the *Glacier de l'Estelette*, the more considerable *Glacier de l'Allée Blanche* now comes into view. Another hr. or less leads down to the level of the *Lac de Combal* (5,774'), which receives the torrents from both the above-named glaciers. This lake is retained by a massive embankment of great antiquity, with sluices which regulate the outflow of the stream, the principal source of the Dora Baltea. A path turning to the rt. above the lake leads to Courmayeur, by the Col de Chéruit, but nothing is gained by taking that way, which is on the whole less interesting than the regular track, though it is recommended to those who make an excursion from Courmayeur to the lake. Below the embankment above-mentioned the mule-track crosses to the l. bank of the Dora, and continues for nearly 1 hr. between the stream and the enormous moraine which conceals from view the *Glacier de Miage*. This great glacier occupies for a considerable distance nearly the entire breadth of the valley, and it is only when the path enters upon the pastures near the Châlet de la Visaille, below its lower extremity, that it comes fully into view. The portion of the Allée Blanche extending from hence to Entrèves is sometimes called *Val de Vénì*. The pine forests which now clothe the slopes on the S. side of the valley, and the more luxuriant vegetation, present an agreeable contrast to the wild and somewhat dreary character of the scenery throughout the long space from Nant Bourrant. Advancing down the valley, and passing opposite the Mont Péteret, the beautiful Glacier de la Brenva comes into view, and is too well deserving of examination to be fully appreciated by a passing traveller; it is more fully noticed below. At the point where the glacier completely traverses the valley, bridging over the stream and abutting against the rocks on the S. side, the path passes by the chapel of Notre Dame de la

Guérison, and winding round the base of the Mont Chétif, reaches the point where the Dora, now grown to a river after uniting in the two torrents that descend from the Col de la Seigne and the Col de Ferrex the drainage of at least twenty glaciers, escapes through the portal opened to the S. between the Mont Chétif and the Mont de la Saxe. After crossing the Dora by a wooden bridge, the path reaches the baths of La Saxe, near to which is the Hôtel du Mont Blanc, commanding a finer view than Courmayeur, and nearer to most of the objects of interest. It was formerly pretty well kept and cheaper than the hotels at Courmayeur, but it is said that the management has fallen off, while the prices have increased. About 1 m. from La Saxe, and 4 hrs.' steady walking from the Col de la Seigne, is

COURMAYEUR (Inns: Hôtel Royal; Angelo; both well managed and comfortable, prices rather high for Piedmont, but less than at Chamouni; visitors remaining some time pay a fixed moderate charge for rooms and living; H. de l'Union, second-rate), a large village, much frequented in summer by visitors from Turin, who seek here mountain air, fine scenery, or the mineral waters, of which several springs exist near the village. In addition to these, it has become of late years a frequent resort of English and other foreign tourists, who have discovered here a rival to Chamouni. Though higher than that village, being about 4,000 ft. above the sea, the climate is considerably warmer, but if in fine weather the days are hot, the nights are always cool. Several of the excursions within easy reach may rival, if they do not excel, those equally accessible from Chamouni, and for a panoramic view of the Mont Blanc range the Cramont may well dispute precedence with the Brévent; but owing to the peculiar conformation of that range already alluded to, it is far more difficult from this side to gain access to the upper snow region, and aspiring mountaineers will probably

continue to look on Chamouni as the best head-quarters for the explorer of Mont Blanc.

In respect to guides, Courmayeur is far behind Chamouni, there being no men at all worthy to rank for general intelligence and information, or the special qualifications of skill and intrepidity, with the best of the Chamouni guides. It has, nevertheless, been thought good policy to assimilate the system to that at Chamouni, both as to the tariff of charges and other details. It is, of course, easy for the holder of an inferior article to ask the same price that is paid for the better one, but the contrivance is not likely to be long successful, or it would be more generally practised. There are many men at Courmayeur quite competent to conduct strangers through all the ordinary excursions, but very few who are worth taking on an expedition of any real difficulty. Valentin Rey and Otto Bion are said to be both efficient men and good mountaineers.

Courmayeur stands at the natural termination of the Val d'Aosta, called, between St. Didier and Entrèves, *Val d'Entrèves*, and the only easy access is by the carriage-road which descends to Aosta. Travellers who take the diligence from Aosta to St. Didier (§ 15, Rte. A) are forwarded in lighter carriages to Courmayeur, a distance of about 3 m., but all the way up hill, so that a pedestrian loses no time. The immediate neighbourhood of Courmayeur, not to speak of the surrounding mountains, produces many interesting plants, such as *Silene vallesia*, *Scutellaria Alpina*, &c.

In appreciating the advantages and drawbacks of Courmayeur as head-quarters for tourists, it is right to say that the view from the village is far more limited than from Chamouni. The summit of Mont Blanc is concealed by the comparatively insignificant Mont Chétif, and none of the higher summits of the range are in sight.

In enumerating the chief excursions to be made from Courmayeur, it may be

observed, that the district has been far less thoroughly explored than the neighbourhood of Chamouni, and an active mountaineer may doubtless cut out for himself many new expeditions. One of these, especially deserving attention, is the ascent of the *Grande Rossère* (10,905'), the highest point in the range, extending ENE. from Courmayeur. From its position this must be the best point for a survey of the least known part of the Mont Blanc range—that between the Mont Dolent and the Aiguille du Géant.

1. *Glacier de la Brenva*. This beautiful glacier descends from the uppermost shelves and plateaux of Mont Blanc directly to the Allée Blanche, which it completely bars across, giving passage to the torrent through a vault beneath the ice, and abutting against the opposite wall of rock. The main portion of the ice-stream is bent round so as to follow the general direction of the valley, and it is apparent that at no distant time it has reached nearly to the junction of the two branches of the Dora at the foot of the Mont Chétif. Although in falling down the steep slope E. of the Mont Péteret the glacier passes round a steep island of rock, there is but slight trace of a medial moraine. Both on account of the grandeur of the surrounding scenery, and the peculiar conditions of pressure in the glacier near to the point where it abuts against the opposite slope of the valley, a visit to this glacier is equally interesting to the lover of nature and the lover of science. It is usually easy to reach the surface of the glacier a short way below the chapel of Notre Dame de la Guérison, and it is also possible, after crossing the river a little way higher up, to mount the slope of the enormous moraine which crosses the valley like a huge railway embankment, care being taken not to bring down the huge blocks that are sometimes piled up in unstable equilibrium. Those blocks come from the Mont Péteret, which towers in the most defiant fashion above the middle region of the

glacier. It is possible, and worth the trouble, to approach very near to its base, and beautiful as are many of the Aiguilles on the side of Chamouni, there is none that for massive grandeur and daring can surpass this. On the narrow ledges, safe from the approach of human foot, the writer has counted 37 chamois in a single herd.

There is no difficulty in descending from the glacier on the N. side; but in warm weather there is sometimes a little trouble in crossing the swollen torrents that come down from the small glaciers lying along the ridge connecting Mont Blanc with the Aiguille du Géant. Lower down a shepherd's track is found that may be followed to Entrèves, but it is worth while to make a slight detour to approach the ice cavern at the foot of the glacier, whence the Dora, now doubled in volume, reissues to the light of day.

2. *Col de Chéruit.* Those who have no occasion to cross the Col de la Seigne, should nevertheless make the summit of that pass the object of a day's excursion from Courmayeur, or, if that be too fatiguing, should at least visit the Lac de Combal. For that purpose they will do well to vary their route, following a mule-path over the Col de Chéruit, between the Mont Chétif and the Cramont. Crossing the Dora opposite the village, the mule-path follows the l. bank of a torrent for $\frac{1}{2}$ m., and then mounts the side of the ravine by steep zigzags to a little oratory perched on a rock. The way then lies over gently sloping pastures to the Col, about 2 hrs. from Courmayeur. From the Col, or, better still, from a rock to the rt., there is a noble view of Mont Blanc and the Allée Blanche. One path descends directly through the pine forest, but it is a better plan to keep to the l. along the slope of the mountain by a rougher path that falls into the valley a little above the Lac de Combal. The latter path is not well traced, and may require a guide. It has the advantage of obtaining a good view of the Glacier de Miage, which is not otherwise well seen.

3. *The Mont Chétif*, also called Mont Dolina, and Pain de Sucre, is the dome-shaped, nearly isolated, eminence, conspicuous from Courmayeur, because it shuts out the view of the main mass of Mont Blanc. Following the above-mentioned mule-path to the Col de Chéruit, a path turns off to the rt. $\frac{1}{2}$ hr. before the Col, and leads in $1\frac{1}{2}$ hr. to the summit of the mountain, commanding a noble view, nearly equal to that from the Cramont, and far easier of access.

4. *The Cramont.* The principal summit of the range separating the Allée Blanche from the valley of the Little St. Bernard is the Cramont (corrupted from Grand Mont). Its position, exactly opposite to the summit of Mont Blanc, is a counterpart of that of the Brévent in the valley of Chamouni. In some respects the panorama is finer, because more free in the direction opposed to Mont Blanc, and commanding most of the higher peaks of the Pennine and Graian Alps. The side of the Cramont, facing Courmayeur, is not absolutely inaccessible, but is so extremely steep that the ascent involves much additional labour and loss of time. The ordinary way requires a considerable detour, and is long, but not very fatiguing. Mules may be taken to within $1\frac{1}{2}$ m. of the summit. It is well to start very early to avoid the heat of the sun during the ascent, and to gain time for thorough enjoyment of the scenery. It is necessary to commence in a manner always distasteful to the mountaineer, by descending for 3 m. to St. Didier. It is possible to avoid the road and follow a path along the rt. bank of the Doire, but this is so rough that it involves some loss of time. From St. Didier the road to the Little St. Bernard (§ 15, Rte. A) is followed for $\frac{1}{2}$ hr., and then a path strikes off to the rt. among larches, and mounts gradually for 2 hrs., passing several chalets. On reaching the limit of the larch, which is here at 6,800 ft., the ascent becomes too steep for mules, and the remainder of the way must be made on foot, chiefly up rather

steep parched slopes of grass not very troublesome to mount, but requiring caution in the descent. $1\frac{1}{2}$ hr. more, or 4 hrs. from St. Didier, suffice to reach the summit (9,059'), consisting of slightly inclined slabs of rock, which on the side facing Mont Blanc project a little beyond the edge of the precipitous face of the mountain. The view has been deservedly celebrated by Sausure, Forbes, and all other travellers who have been fortunate enough to reach the summit in favourable weather. If it be allowable to note a defect in the presence of a scene so magnificent, it may be said that the Mont Chétif and a portion of the lower part of the Cramont itself prevent the eye from reaching the bottom of the Allée Blanche, and thus, although the height is considerably greater than that of the Brévent or the Mont Joli, the range of Mont Blanc is not here seen to spring out of a valley relatively so deep or so well defined. 3 hrs. suffice for the descent to St. Didier. On reaching the point where the mule-path comes to an end, a practised cragsman may descend direct to Courmayeur; not much time is saved, but he gains the pleasing excitement of a stiff scramble.

The ascent of the Cramont is sometimes taken in the way from Courmayeur to the Little St. Bernard, by travellers intending to sleep there or at Bourg St. Maurice (§ 15, Rte. A).

'The traveller who proposes to make a visit to the Cramont a part of his day's journey to St. Maurice, should start very early, and direct that the mules, if he take any, should, from where he left them, be sent across the pasturages, to châteaux which lie in his way to the village of La Balme. He will thus gain time in ascending the valley, though the descent to the hamlet of Eléva, down a steep and rugged path over loose stones, is fatiguing. La Balme is in the valley, about an hour's walk above where the path up through the forest leads to the Cramont; and there is no object of interest missed between the two places.'—[M.]

5. *The Mont de la Saxe*, rising NE. of Courmayeur, commands a view of the Grandes Jorasses and the adjoining peaks, which is even superior to that from the Cramont. It is easily reached in $2\frac{1}{2}$ or 3 hrs., and well deserves a visit. 'After passing the baths of La Saxe, the track to the rt., leading into the Val Ferrex, is followed for a short distance, and then the ascent begins by an easy path, which gradually reaches the summit; this is a sort of undulating plateau, in which no single point much overlooks the rest. The finest view is from an eminence called the Croix de Bernada.'—[M.]

6. *The Mont Carmel*, also called Mont Cormet, and Mont Merou, lies about due W. of Courmayeur in the range whose highest summit is the Grande Rossère. It is fully 1,000 ft. higher than the Mont de la Saxe, and about on a level with the Cramont. The ascent is here pointed out as deserving attention, and information respecting it is desired.

7. *The Col du Géant*, leading from Courmayeur to Chamouni, is described in Rte. F. Those who do not intend crossing the pass may make an extremely interesting excursion to the summit, returning in the afternoon to Courmayeur. Practised mountaineers may, in settled weather, find the way without a guide, but a solitary traveller should on no account attempt to descend on the N. side of the pass, as there is usually a concealed crevasse a short distance below the Col.

ROUTE C.

SALLANCHES TO CONTAMINES AND
COURMAYEUR, BY ST. GERVAIS.

$4\frac{1}{2}$ hrs.' walking to Contamines.

The large majority of foreigners who reach Sallanches from Geneva, are bound for Chamouni, and follow the

road described in Rte. A, but many Swiss visitors pass through that place on their way to the baths of St. Gervais, and some mountaineers have found the village of St. Gervais, about a mile above the baths, to be convenient headquarters for exploring the W. side of Mont Blanc. Travellers who have already visited Chamouni, and are bound for the S. side of Mont Blanc, may, by following the direct way here described, reach Contamines, or even Nant Bourrant, on the evening of the first day, and so gain Courmayeur on the second long day from Geneva.

From Sallanches there is a good char-road to the baths, a distance of 6 miles—cost of a char, 5 or 6 fr. The road keeps near the base of the mountain at some distance from the Arve, leaving on the rt. the road which mounts by Combloux to Megève (§ 12, Rte. A). On the slope below the first of those villages, and near *Domency*, are a profusion of erratic blocks deposited there by the ancient glacier; and near to the baths of St. Gervais the remains of a gigantic moraine, partly cut away by torrents, well deserve examination. After passing the Bonnant, just where it issues from the valley of Montjoie, one road, turning sharp to the l., leads to Chède, on the direct way from Sallanches to Chamouni (Rte. A), and another mounts the hill to the village of St. Gervais. A traveller who has engaged a char to the village need not pass by the baths, but it is shorter for a pedestrian to keep the lower road, which leads in $\frac{1}{2}$ hr. from the bridge to the *Baths of St. Gervais* (2,067'), standing in a picturesque situation in the rocky gorge of the *Bonnant*. For the extent and completeness of the buildings and their appurtenances, they surpass all similar establishments in Savoy. The edifice comprises a large central pile connected on either side with two wings, containing more than a hundred bed-rooms, with several large public rooms for dinner, conversation, dancing, and music. There is besides a considerable library and a collection of natural history, antiquities,

&c. The charge for persons remaining *en pension* is 8 fr. a day. This place was formerly much frequented by good Swiss society, but complaints as to the management, and the unobliging disposition of the proprietor or director, have been frequent of late years. Those who think of remaining there for any time will do well to ascertain whether there has been a change in the management. Of the two principal springs, one is warm and sulphureous, the other chalybeate. The ascent of the Mont Joli may be made in $4\frac{1}{2}$ hrs. from the Baths.

A rather steep path, much shorter than the char-road, and commanding fine views, leads, in 20 min., direct from the Baths to the village of

St. Gervais (Inns: H. du Mont Joli, very well kept, pension 6fr. a day; H. du Mont Blanc; H. de l'Union; H. du Prarion), finely situated at 2,680 ft. above the sea, and 613 ft. above the Baths. This place has been resorted to by mountaineers of late years, in part because it is well situated for some excursions on the W. side of Mont Blanc, but mainly to escape from the vexatious restrictions and exorbitant tariff of the Regulations for the Guides at Chamouni. There are several good guides here, not perhaps quite equal to the very best of the Chamouni men, but thoroughly trustworthy. Of these, Hoste, and Joseph and Lucien Jacquet may be recommended. Mollard, who was highly thought of by his employers, no longer undertakes difficult expeditions, but may be consulted with advantage. He lives at La Villette, near Bionnay.

[Three ways lead from hence to Chamouni: the char-road above mentioned, passing by Chède, makes a long detour; the way by the Col de Voza (Rte. B), which is the most interesting, also involves a circuit; a more direct way, shorter by 2 m. and considerably lower, is by the *Col de la Forclaz*. A char-road has been for some time in progress. Mules take nearly 5 hrs. to reach Chamouni, but $4\frac{1}{2}$ hrs. suffice for a pedestrian. The summit (4,952') commands a view similar to that from the Col de

Voza, but less commanding and more limited. Superior to either is that from the summit of the Prarion between the two passes; but this is most conveniently reached from the Col de Voza.]

The ascent from the village of St. Gervais to Bionnay, along the rt. bank of the Bonnant, requires but 45 min.; and there the mule-track to Contamines joins the way from Chamouni described in the last Rte.

ROUTE D.

COURMAYEUR TO CONTAMINES, BY THE COL DE TRÉLATÊTE.

10 hrs.' walking.

The way from Chamouni to Courmayeur described in Rte. B, passing round the W. side of the range of Mont Blanc, and the circuit by the eastern end of the same range described in Rtes. H and K, both involve a detour which is not less than four times the direct distance between those places; but it is possible to reduce considerably the distance, and in a less degree the time necessary for the journey, by glacier passes of more or less difficulty. The Col de Miage and the Col du Géant, described in the two following routes, are the only passes which lead directly into the Allée Blanche. The first is one of the most arduous which has been yet traversed, and the second is sometimes difficult and at all times a laborious expedition. The way described in the present route has only been known of late years, but bids fair to be the favourite passage for those who, without seeking difficulties, are anxious to add the enjoyment of fine glacier scenery to all that is really interesting in the old route. Between Contamines and the Col de la Seigne it saves not less than 5 hrs. on the way by Chapiu; and it is just possible for a pedestrian in thorough training to make the whole distance from Chamouni in one long day, but far more advisable to sleep at the Pavillon de Trélatête or at Con-

tamines. In the following account, with which the editor has been favoured by Mr. F. F. Tuckett, the way is described as taken by that gentleman from the Col de la Seigne to Contamines. When the passage is made in the opposite direction, at least 1 hr. more should be allowed between those points; but, on the other hand, it is necessary to allow nearly 5 hrs. for the ascent from Courmayeur to the Col de la Seigne, while 4 hrs. suffice for the descent. A guide is necessary for this pass, and whenever snow lies on the glacier, none of the ordinary precautions should be omitted. By Mr. Tuckett's observations the height of the Col is 9,204 ft.

'On quitting the Col de la Seigne, the traveller, instead of proceeding forwards to Motet, must strike off to the rt. towards a depression in the ridge between the Aiguille du Glacier and a more westerly summit—known as the *Tondu* or Tandieu. To reach this point the *Glacier des Lancettes* must be traversed, but as it is cut off from the Col de la Seigne by some steep ravines, time would probably be gained by descending first for a few hundred yards to the W., crossing its lower portion, which does not present any serious difficulty. From the W. side of the Glacier, gently inclined slopes of snow lead up to the depression already alluded to, and in about 2 hrs. after quitting the Col de la Seigne that of Trélatête is reached. The view is a fine one, but travellers are recommended to climb the rocky point to the NE. which commands a greater extent of horizon. To the S., the Graian Alps from the Grivola to the Grande Casse are admirably seen. The mass of the Tondu confines the range of vision in a W. direction, as that of the Aiguille du Glacier does to the eastward, but between NW. and NE. the summits of the Aiguilles de Miage and Berenger, with the ranges bordering the valley of the Arve, form very beautiful features in the view. Beneath is the central part of the *Glacier de Trélagrande*, commonly called *Glacier de Trélatête*, and

over its head, between the *Aiguille de Miage* and *de Trélatête*, the summit of Mont Blanc is a very grand and conspicuous object. The perspective extent of snow-surfaces is proverbially deceptive, and in the present instance the *névé* of the glaciers before us appeared to unite directly with the W. slopes of the Mont Blanc. In reality, however, the entire basin of the southern *Miage Glacier* intervenes, and is separated from the head of that of *Trélatête* by extremely precipitous, if not impassable slopes of rock, which are well seen from the *Col de Miage*.

‘To gain the *Glacier de Trélagrande* from the *Col*, it is necessary to keep to the l. in the direction of the *Tondu* for a short distance, then turn to the rt. in order to avoid the crevasses on the l. side of the lateral glacier which descends from the *Col*. A quarter of an hr. suffices for the descent, and the course then lies down the middle of the central portion of the main ice-stream, which is a noble one, and bounded by numerous lofty summits—the *Tondu*, the *Aiguille du Glacier*, the *Aiguille de l’Allée Blanche*, the *Aiguille de Trélatête*, *Mont Blanc* (seen over its head), the *Aiguille de Miage* and the *Aiguille de Berenger*. The inclination soon increases, but the crevasses present no serious difficulty, and a second and lower plateau, above the final ice-fall, is reached in about $\frac{1}{2}$ an hr. Leaving the centre of the glacier, and making diagonally for the rt. lateral moraine, the ice is quitted about 1 hr. from the *Col*, and a short scramble down *débris* and rocks brings the traveller to a path leading to the *Pavillon de Trélatête* in rather less than $\frac{1}{2}$ hr. The noble ice-fall on the l. is a grand and beautiful object, whilst in the opposite direction nothing can be conceived more lovely than the bird’s-eye view down the *Val de Montjoie*. The *Pavillon* affords good sleeping accommodation, and would be in many respects the best starting-point for those going to *Courmayeur*. Other interesting excursions may be made from it, such as the ascent

of the *Aiguille de Miage* and *Aiguille de Berenger*, the exploration of the upper portion of the *Glacier de Trélatête*, &c. The landlord and his wife are well spoken of. The descent from the *Pavillon* to *Contamines* occupies about 1 hr. It will thus be seen that the entire distance from this *Col de la Seigne* to *Contamines* need not occupy more than 5 hrs. Taken in the opposite direction, more time must be allowed, on account of the lower level of the starting-point.’—[F. F. T.]

ROUTE E.

CHAMOUNI TO COURMAYEUR, BY THE
COL DE MIAGE.

18 hrs.’ walking.

It has been already remarked, that the only considerable breach in the range of Mont Blanc is that indicated by the *Col de Miage*. It is not merely that this is the lowest depression in the range, but that the two glaciers, both named *Glacier de Miage*, which descend N. and S. from the *Col*, lie in hollows that are cut deeper and farther into the mass than any other. The ridge over which the pass lies has been truly likened to a dyke or causeway, connecting together the *Aiguille de Bionnassay* with the *Aiguille de Miage*, and it is so steep on both sides that two points, which, if a tunnel existed, would not be quite 2 m. apart, are separated by 8 or 9 hrs. of laborious climbing. The S. *Glacier de Miage* occupies in truth the only considerable break in the continuity of the S. ridge of Mont Blanc between the *Aiguille du Glacier* and the *Mont Dolent*.

The *Col de Miage* has been several times reached by adventurous mountaineers, who have sought in this direction a new route to the summit of Mont Blanc. It would be rash to fix limits to the energy and perseverance of our countrymen, but it may be safely predicted that whatever way

may be forced in this direction will be found much longer and more difficult than those already known. As a pass from the Allée Blanche to Chamouni or to St. Gervais, the Col has been little used, nor is it likely ever to become frequented. The earliest passage, as far as the writer knows, was by some chamois hunters, of whom one perished in a crevasse at the N. base of the Col. The first foreign traveller was Mr. Coleman, who has given an account of his passage in 1858, in his beautiful work, 'Scenes from the Snow Fields.' Another interesting account of the pass, by Mr. J. G. Dodson, is contained in the second series of 'Peaks, Passes, and Glaciers.' Mr. Dodson and his companions achieved the whole distance from Courmayeur to Chamouni in a single day of rather less than 19 hrs., of which but $1\frac{1}{2}$ hr. was given to halts. But this *tour de force* was accomplished under very favourable circumstances, by men who were in the highest state of training, and who were thus enabled to accomplish the less difficult parts of the day's journey in much less than the usual time. The difficulties on the S. side seem to be rather greater than on the N., but in whichever direction it be taken, none but first-rate men should be employed as guides, and none of the approved precautions and appliances of glacier-travelling should be omitted. In taking the pass from Chamouni it is advisable to sleep at the *Châlets de Miage*, or else at that of La Turche, higher up on the N. side of the glacier. When taken from Courmayeur a traveller may rest for the night at the *Châlet de la Visaille*, near the foot of the southern Glacier de Miage.

Starting from Chamouni the way lies for $4\frac{1}{2}$ hrs. over the Col de Voza (Rte. B), to the foot of the Glacier de Bionnassay. On the S. side that glacier is bounded by a ridge, whose prominent summits in descending are the *Aiguille de Bionnassay*, the *Aiguille de Tricot*, and the *Mont Vorassay*. Between the two last named is a comparatively low pass, called *Col de Tricot*, leading from

the lower end of the Bionnassay Glacier to the *Châlets de Miage*, on the N. side of the Miage Glacier. Should the traveller have slept at the Pavillon on the Col de Voza, or at Bionnassay, he need not, in passing from the Col de Tricot, descend so low as the *Châlets de Miage*. The ascent along the slopes, and afterwards by the moraine of the Glacier de Miage, is rather long and fatiguing. On reaching the upper level of the glacier the aspect of the ridge which has to be traversed is formidable even to experienced mountaineers. Its appearance is that of a gigantic dyke, 2,000 ft. in height, rising almost abruptly from the gently sloping *névé* of the upper glacier, and defended by a series of great crevasses, of which one especially, a true *bergschrand*, runs along the base of the rocks by which the ascent is effected. Usually, but not always, a snow bridge is to be found at the required point. In the centre of the ridge, just below the lowest point of the Col, a steep couloir of snow extends from top to bottom of the slope, flanked on either side by extremely steep rocks. Beyond these rocky *arêtes*, on either side the ridge, appears still more impracticable, the ice-slopes being of formidable steepness, and interrupted now and then by ledges of rock or vertical faces of ice. The most obvious way of attempting the ascent would be by the snow-couloir, which, though in truth very steep, is not quite beyond the limit of what may be accomplished by step-cutting; but the experienced mountaineer will anticipate the real difficulty, which lies in the fact that the couloir is the channel through which masses of snow and detached fragments of rock shoot, rather than slide, down to the bottom of the ridge. It is by the rocks to the l. or NE. of the couloir that the ascent is effected, and they are so steep and difficult that fully $2\frac{1}{2}$ hrs. must be allowed. In the first ascent of this side of the Col, of which any account has been published, and which is contained in the first series of 'Peaks, Passes, and Glaciers,' Messrs.

Hawkins, Davies, Hort and Watson, who were forced speedily to redescend by a snow-storm encountered near the summit, were led by Octenier, an experienced and now elderly guide, by very steep rocks and snow-slopes on the l., till they reached the rocky ridge in question at a considerable height above the bergschrund at its base, the object being to avoid that difficulty. At certain times, when there is no snow-bridge, that course, although tedious, would be the most expedient. The summit of the Col (11,100'?) is but a very few yards in width, and the view is chiefly interesting as the only point near at hand from whence the W. side of the peak of Mont Blanc has yet been surveyed. From the S. side of the Col a broad couloir, or corridor of ice, seemingly not impracticable, leads up the slopes of the Aig. de Bionnassay in the direction of the Dôme du Goûté, and it is by this that a way to the summit of Mont Blanc has been suspected.

The southern Glacier de Miage is altogether on a grander scale than that on the N. side. It receives the snows which accumulate in a great amphitheatre formed by the ridge extending from the summit of Mont Blanc to the Dôme du Goûté, and thence to the Aiguille de Bionnassay, descending in an ice-fall of the grandest character to the lowest level, which stretches down into the Allée Blanche. To effect the descent, it is necessary to pass some way along the ridge of the Col towards the SW., where it is narrowed to a mere path, and then to traverse a moderately steep slope of névé, beset with concealed crevasses. After a $\frac{1}{4}$ hr. this leads to the summit of the excessively steep crags on the W. side of the great ice-fall, by which alone access to the Col from the S. side appears practicable. These are of great height, and traversed by couloirs of snow or ice, and the descent requires great care, steadiness, and patience, as 3 hrs. are required for the purpose. At the base of these rocks the difficulties are not yet over, as a portion of the

glacier, very steep and much crevassed, still remains before the traveller can reach the more gently inclined tract where, for the first time, it becomes prudent to cast off the rope, and where the ice-axe may at length be let to rest. The view of the grand masses that enclose the glacier, and of the great horse-shoe fall of ice, by the side of which the descent has been effected, is of the most sublime character, and should oftener lead visitors to Courmayeur to explore the lower part, at least, of this glacier. Crevasses are rather numerous, but do not here oppose any real difficulty. In about 6 hrs. from the Col, or perhaps less if the ice be in favourable condition, the traveller may hope to have got clear of the moraine, and reached the mule-path leading to Courmayeur (Rte. B). It is quite possible that, if taken rather early in the season, before the crevasses have widened and lost their snow-covering, yet not so early as to incur much danger from avalanches, this pass may be effected in considerably less time, and with less labour than has fallen to the share of its earliest explorers.

ROUTE F.

CHAMOUNI TO COURMAYEUR, BY THE COL DU GÉANT.

12 to 14 hrs.' walk, according to the state of the glacier.

This, for a long time, was the only known pass across the range of Mont Blanc, and until very lately was supposed to be the highest in the Alps. The exertions of recent explorers, almost all of them members of the Alpine Club, have, however, added so largely to the list of practicable cols across the loftiest ridges, that the Col du Géant has had to yield precedence to at least 25 competitors. Even though this list should hereafter be largely increased, this pass, traversing the very centre of the most extensive glacier region of Mont Blanc, and de-

scending into Piedmont from a point which overlooks all the southern ranges of the Alps, will always remain one of the most interesting to the lover of grand scenery; and there are few excursions that, within the compass of a single day's walk, initiate a stranger so thoroughly in the wonders and beauties of the ice-world.

In taking the pass from Chamouni it is a saving of 2 hrs.' walk to sleep at the Montanvers, and a still greater economy of labour is effected by starting from the Mont Fréty, when the journey is made in the opposite direction; but as there is a good path leading to either halting-place, the distance may be accomplished on foot or with a mule before daylight in the morning, by a steady walker who does not fear fatigue, and who wishes to secure ample time for enjoying the pass, and for contending with any difficulties that may arise from the state of the glacier. Constant liability to change is the familiar characteristic of the glacier region, but there is no moderately frequented pass so liable to vary in the degree and nature of its difficulties as the Col du Géant. These arise almost exclusively in the passage of the ice-cascade, for the remainder of the pass, though fatiguing when the snow is in bad order, involves no risks whatever, other than those which everywhere in the Alps attend the neglect of well-known precautions. The unfortunate accident which in 1860 cost the lives of three English travellers, and that of one of their guides, and which might just as easily have occurred in many places often visited by travellers, need not deter any well-trained pedestrian, accompanied by an experienced guide, from making the pass in fine weather. If not somewhat used to glacier-travelling, he will do well to take two guides, and however competent in other respects, he should neglect none of the established appliances and precautions. Early in the season, when the crevasses are comparatively narrow, if the snow happens to be in good order, the pass

may be effected in considerably less time than is requisite in August, when most frequently passed by strangers.

From the Montanvers the way to the Col du Géant is by the same route as that taken to the Jardin (Rte. A, Excursion 4), until after passing Trélaporte. Then, instead of bearing to the l. towards the E. side of the glacier, the route lies direct towards the rocks of the Tacul, until in about $2\frac{3}{4}$ hrs. the traveller finds himself opposite the opening of the *Glacier du Géant*, sometimes called *Glacier du Tacul*. The lower part is moderately even and easily traversed, especially on its E. side, but beyond this is seen the great ice-cascade, 'like the foam of ten Niagaras placed end to end and stiffened into rest.' This exhibits on the grandest scale that peculiar condition of the ice for which Saussure's name, *séracs*, has been retained (see Introduction, Article, *Glaciers*). It is caused by the descent of the vast masses of ice formed in the upper basin between the ridge of the Col du Géant and the Mont Blanc du Tacul, through a comparatively narrow opening between the steep rocks of *La Noire* on the E. and the mass called *Le Rognon* rising from the midst of the ice to the W. The earlier passages were generally effected on the W. side of the ice-fall, but it is now generally agreed that in all states of the ice the difficulties are less serious on the E. side, where there is the further advantage that it is sometimes possible to take to the rocks when the crevasses are too troublesome. It is impossible to fix the time requisite for the ascent where an hour is sometimes consumed in advancing two or three hundred yards, but, except under unusually favourable circumstances, from 4 to 6 hrs. from the Tacul are required to reach the summit of the Col. The rope should not be cast off till the very top is gained, as some crevasses, usually covered over, recur at intervals throughout the upper part of the ascent.

From the summit of the Col, 11,197 ft.

in height, the traveller sees little to remind him that he is standing on the main ridge of Mont Blanc. The great group of peaks surrounding the Aiguille Verte does indeed preserve its familiar outline when seen from a few yards N. of the Col, but so dwarfed as not to be immediately recognised. The main mass of Mont Blanc, and the Aiguilles that separate the upper basin of the Glacier du Géant from the valley of Chamouni, present a still more unusual aspect; but the portion of the horizon which attracts most attention is that lying to the S., where the great mass of the Graians and many of the higher peaks of the Cottian and Dauphiné Alps, sometimes even far distant glimpses of the Maritime Alps and the Ligurian Apennine, fill up the panorama.

The reader of Saussure's travels will recall with interest the account of his ten days' residence on this spot. In spite of all that has been done in modern times, no more striking proof has been given of persevering devotion to the cause of science. The highest rocks, which are within a few feet of the actual Col, are almost exclusively composed of pure quartz, which is here all but the sole constituent of the protogine form of granite that constitutes the axis of the Mont Blanc range. Tolerable crystals are easily obtained.

The descent towards the Val d'Entrèves may at first appear alarmingly long and steep, but except in bad weather, does not present any real difficulty. A ridge projecting very slightly from the face of the mountain at once presents itself as the natural and secure track. The ground is very rough, and when fresh snow fills the crevices between the points and edges of rock, some caution is necessary to avoid disagreeable slips. After a short descent the character of the ridge is more fully seen; on the l. it overhangs a snow couloir, which lower down terminates in an apparently impracticable gully; on the other side is a snow-slope, which may be reached

without difficulty, and which, although steep, may be used by practised mountaineers, as rather less troublesome than the rocks. This snow-slope terminates, however, in that fatal ravine where the three travellers and the guide, Frédéric Tairraz, were lost in 1860. Having three tired and unpractised travellers in charge, the guides first committed the serious imprudence of exchanging the security of the rocky ridge for the slippery snow-slope, but were guilty of the more inexcusable error of merely holding in one hand the rope to which the travellers were attached, instead of fastening the same round their bodies. It is impossible to use the alpenstock with effect in checking the descent on an ice or snow-slope when it is held in one hand only; but all experienced mountaineers are agreed that three men with hands free, and knowing how to use the alpenstock, could pull up three travellers, however helpless, on a far steeper slope than that where the fatal accident arose.

The steepest part of the rocky buttress down which the traveller has descended is its base, where it springs from a more gently inclined ridge connecting it with the Mont Fréty. This is the only point on the S. side of the pass where a man used to mountain climbing need wish the aid of a guide, but by a little searching he will find an exit, and on reaching the base his difficulties are over, though a long interval still separates him from the valley below. The ridge which gradually expands from hence towards the Val d'Entrèves, and is covered towards its base with a forest of pine and larch, is called the Mont Fréty. Not far below the base of the rocks, near the limit of the highest pastures, a small inn was erected a few years ago by the Courmayeur guides, and leased to a tenant who acts as innkeeper. This worthy has surpassed, in the shameless audacity of his charges, and in the means which he has taken to enforce them, all preceding example. It may be hoped that travellers will make it known that they

will abstain from patronising the inn until the management is thoroughly reformed. There is no doubt that the position is convenient as a halting-place for those who take the path from Courmayeur, but they may save fatigue by riding as far as the inn, starting, if well advised, an hour or two before daylight. A traveller who does not object to hurry down a long and steep slope, may save a little time by descending direct through the forest which clothes the base of the Mont Fréty, and terminates close to the village of Entrèves, whence a char-road leads in about 2 m. to Courmayeur (Rte. B).

ROUTE G.

ASCENT OF MONT BLANC.

The ascent of the highest mountain in Europe long passed for a mountaineering exploit of the first order, deserving of special record, and admitting, on the part of those who achieved it, of a style of high-flown description which gave a formidable idea of the difficulty of the performance. Such descriptions represented, for the most part in perfect good faith, the impression made upon the minds of travellers by phenomena new and imposing from the grand scale on which they operate, very much heightened by ignorance of their laws, which left the imagination subject to an ill-defined sense of wonder and terror. The same descriptions might, however, with little alteration, have served for the ascent of many other of the glacier-clad peaks of the Alps, and according as experience has made men familiar with the means and precautions required, and more accurate knowledge has enabled them to understand the obstacles to be overcome, and the dangers to be avoided, it is found that the ascent of Mont Blanc by the ordinary route is an expedition involving no peculiar difficulties, nor, when made in favourable weather, any appreciable risk. The shrewdness of the

natives of the valley of Chamouni has led them to invest the ascent with as much importance as they can contrive to give to it, and while they were able to obtain for a number of men ten times the remuneration which would be considered sufficient for the same amount of labour and exposure at other seasons of the year, they were not likely to diminish the allowance of powder that is burned to celebrate each successful ascent. Of late years the number of ascents has very largely increased, and the evil now to be guarded against is not so much undue appreciation of the difficulties as an under-estimate, leading men to neglect needful precautions, and to dispense with the requisite amount of previous training. To guard against immediate danger, the guides are usually quite worthy of reliance, and if the object be simply to reach the summit, and come down again without bodily hurt, most Englishmen of active habits, who agree to pay the proper number of francs to the guides and innkeepers at Chamouni, may count on achieving their object, provided the weather be favourable, or they have the patience to wait until it becomes so. But men who desire not merely to accomplish a feat, but to enjoy, in the true sense of the word, an expedition which brings them face to face with so many phases of the beautiful and sublime in Nature, must recollect that for that object some general and some special preparation is necessary. That amount of training of the muscles which will support without undue fatigue almost continued exertion, with but short intervals of rest, and little or no sleep, during 24 hours or more, is not generally obtained without several days or weeks of previous practice. This might be acquired on Scotch moors as well as on the Alps, but it is only here that a man can gain that familiarity with the ice-world which is essential to an intelligent enjoyment of its wonders and its beauties. The keenest observer, plunging suddenly into scenes where everything is new, and, unlike previous experience, carries away

but a confused and over-crowded series of impressions, instead of those indelible pictures that he might otherwise retain. At the least, a traveller should begin by devoting several days to the exploration of the higher glaciers, however thoroughly trained he may otherwise be. It should not be forgotten that some persons are liable to suffer severely from the combined effects of rarefied air and unusual exertion at a great height. Apart from the difference of constitution in individuals, which can be ascertained only by trial, there is no doubt that habit has a great influence in making men insensible to this distressing affection. Those who have accustomed themselves to breathe the air at heights of 11,000 or 12,000 ft. rarely, if ever, feel inconvenience when they mount some 3,000 or 4,000 ft. above that limit.

The form of the central portion of the range, to which alone the name *Mont Blanc* is properly given, has been partly indicated in the introduction to this chapter, and may be better understood by referring to a tolerable model than by verbal description. The highest summit, or calotte, lies in the range of peaks which overhangs the Allée Blanche. It has been compared to a dome of snow irregularly cut away on the N. and S. sides, standing on a vast basement propped up by buttresses of rock, of which the most prominent are the Mont Broglia and the Mont Péteret. If the range of aiguilles that enclose the valley of Chamouni were continuous from the Aig. du Midi to the Aig. du Goûté, the summit of Mont Blanc would be completely shut out from that side, but between those two summits there is a wide opening through which two great glaciers descend into the valley. This opening corresponds to the main peculiarity in the architecture of the mountain. From the central mass a massive ridge stretches due N., and by the comparative evenness of its outline presents a remarkable contrast to the jagged and bristling forms of the surrounding ranges. In this ridge the first prominence has the descriptive name *Bosse*

du Dromadaire. The next noticeable feature is the huge rounded mass of the *Dôme du Goûté* (13,294'), and at the N. end, formed by the *Aiguille du Goûté* (12,530'), the ridge is cut away abruptly on three sides by steep slopes, after the fashion of the gable ends of old French roofs. Corresponding in some measure to this ridge, another, bolder in form, diverges from the summit towards the NE. Its two chief summits sometimes pass under the collective name *Monts Maudits*, but the farther and more massive of the two is generally known as the *Mont Blanc du Tacul*, while the nearer peak is called *Mont Maudit*, or *Aiguille de Saussure*. Although separated from the *Mont Blanc du Tacul* by a deep cut through precipitous rocks, the *Aiguille du Midi* may be considered to be the natural termination of this ridge, corresponding in position, though not in form, to the *Aiguille du Goûté*.

In the angle between these converging ridges is the *Grand Plateau* (12,900'), a level space, probably filled to an enormous depth with accumulated névé. Below this the great snow-valley between the N. and NE. ridges is divided longitudinally by a much smaller subordinate ridge, in great part covered with névé and glacier, but projecting through this envelope in the sharp peaks of the *Grands Mulets*, and terminating in the *Montagne de la Côte*, which divides the *Glacier des Bossons* from the *Glacier de Tacconay*. The latter originates in the névé that accumulates on the E. slopes of the *Dôme du Goûté*, and in the fold or ledge between it and the ridge of the *Grands Mulets*, while the *Glacier des Bossons* drains the much wider snow-valley between the latter ridge and that of the *Aiguille du Midi*.

Up to the present time but two routes have been discovered to the summit of Mont Blanc. The one, described below as the St. Gervais route, lies along the summit of the ridge extending from the top to the *Aiguille du Goûté*; the other, now called the Chamouni route, lies mainly along the E. base of the same ridge, by

the ledge formed between it and the minor ridge of the Grands Mulets.

The first step towards the ascent of Mont Blanc was made by Saussure, who, after his first visits to Chamouni in 1760 and 1761, offered a liberal reward to the person who should first find a way to the summit.

The first attempt was not made till 1775, when four guides mounted by the Montagne de la Côte, and probably arrived some way above the Grands Mulets when they were overpowered 'by the reverberation of the sun from the snow, and the stagnation of the air in the valley.' The next attempt, in 1783, was abandoned because one of the party of three guides was seized with an irresistible desire to sleep. Later in the same year M. Bourrit made his first attempt, but was driven back by a storm.

In 1784 M. Bourrit learned that two chasseurs had reached a great height on the Aiguille du Goûté, and had found the snow-slopes 'so well aerated' that there was no risk of the suffocation caused by 'the stagnation of the air in the great snow-valley.' He accordingly started with the same chasseurs, but having gained the foot of the Aiguille du Goûté, he was overcome by cold and fatigue. The two chasseurs went forward, and attained a much greater height.

In September 1785, Saussure, with his son and M. Bourrit, made his first attempt by way of the Aiguille du Goûté. The party passed the night at a cabane, which had been prepared near the foot of the Aiguille. On the next day they took the same course that has been followed by recent travellers, crossed the 'Grand Couloir,' and climbed some way farther up. Here they were arrested by the quantity of fresh snow on the ledges of the rocks, and they retreated after gaining a height of 12,195 ft.

In June 1786, Pierre Balmat, with two other guides, commissioned by Saussure for the purpose, erected another cabane higher up and nearer to the base of the Aiguille du Goûté. On the following day they climbed the Aiguille, and

reached the summit of the Dôme du Goûté, where, by previous arrangement, they met Dr. Paccard with Jacques Balmat and two others, who had ascended by way of the Montagne de la Côte. The united party reached the commencement of the ridge connecting the Dôme with the summit, but judging this to be impracticable, they redescended towards Chamouni. On the way, Jacques Balmat separated from his companions, and passed the night alone on the snow. The following day was employed by him in exploring the mountain, and he then succeeded in discovering the way from the Grand Plateau to the summit.

In the month of August of the same year, Balmat actually reached the top for the first time, and led with him Dr. Paccard, and in July 1787 made his second ascent with two other Chamouni guides.

Saussure made soon after his celebrated ascent with Jacques Balmat and seventeen other guides. Starting on the 1st August, he passed the first night at the top of the Montagne de la Côte, and the second at the Grand Plateau. On the 3rd August he reached the summit, where he remained $3\frac{1}{2}$ hrs., and redescended to a point about 1,300 ft. below the bivouac of the previous night, returning to Chamouni on the fourth day. Five days later Colonel Beaufoy, an English traveller, made a successful ascent, in which he was destined to be followed by so many of his countrymen.

For a long time no change was made in the route followed by Balmat and Saussure, except that it was found more convenient to pass the first night on the rocks of the Grands Mulets, rather than on the Montagne de la Côte, and to reach the halting-place by ascending the rt. bank of the Glacier des Bossons to the Pierre à l'Échelle, and then crossing the glacier.

In 1820 a large party, including Dr. Hamel, a Russian, and two English travellers, who persisted in the ascent against the advice of the guides, after a fall of fresh snow, was cut in two by an

avalanche while ascending the steep slopes between the Grand Plateau and the highest peak, and three guides thus lost their lives. This, the solitary fatal accident that has happened in the large number of ascents, suggested the expediency of a change of route. Accordingly, in 1827, Messrs. C. Fellowes and W. Hawes, with Jos. Marie Couttet and several other guides, struck out a new way by the Corridor and the Mur de la Côte, which has been generally followed since that ascent.

No serious attempt seems to have been made to discover a new route to the summit until 1854, when Mr. J. H. Ramsay endeavoured to strike out a way from the Col du Géant. In this he was not successful, nor did better fortune attend a party of English travellers who renewed the attempt in the following year. Having gained the gap between the Aiguille du Midi and the Mont Blanc du Tacul, and reached a great height on the W. side of the latter peak, they were stopped by bad weather and forced to retreat.

A few days later the same party made a new attempt from St. Gervais. Having passed the remains of Saussure's cabane of 1785, they spent the night in another higher up, erected in 1854 by a M. Guichard. Early on the next morning they climbed the Aiguille, and reached the summit of the Dôme du Goûté. Leaving behind them the porters and two of their companions, the party, consisting of the Revds. C. Hudson, Grenville, and Christopher Smith, and Messrs. E. S. Kennedy and C. Ainslie, descended to the Grand Plateau, and reached the summit, without guides, on the 14th August, 1855.

This ascent had the effect of emancipating travellers from the vexatious restrictions of the old Chamouni regulations, and the unreasonable expenses to which they were there subjected, but it left the route to the summit by the N. ridge still incomplete. Several attempts to supply the portion still wanting, and one intended to discover a new route by the Col de Miage, were made in 1856,

and were all defeated by bad weather. These are recounted by Mr. F. V. Hawkins in the first series of 'Peaks, Passes, and Glaciers.'

It was not until 1859 that the practicability of the ridge connecting the summit with the Dôme du Goûté was finally established by the Rev. C. Hudson, who four years earlier had taken a leading share in the first ascent from St. Gervais. Having mounted from Chamouni to the Grand Plateau by the ordinary route, he then ascended the Dôme du Goûté, and followed the ridge leading to the summit by the Bosse du Dromadaire.

In order to complete the new route, it now only remained to unite together the separate portions in a single ascent from St. Gervais. This was effected for the first time in 1861 by the Rev. Leslie Stephen and Mr. F. F. Tuckett, who reached the summit direct from St. Gervais on the 18th July, thus completing the undertaking commenced 76 years previously by Saussure and his companions.

1. *The Chamouni Route.* From the hamlet of Pélerins, 2 m. from the Prieuré, a path mounts rather steeply through a pine forest, and then over Alpine pastures, keeping at some distance from the Glacier des Bossons, from which this part of the way is separated by a deep ravine often partly choked by the remains of the spring avalanches. Those who would spare their legs may ride for $2\frac{1}{2}$ hrs. from Les Pélerins. On approaching the base of the Aiguille du Midi the way becomes rougher and steeper, and after passing beneath overhanging rocks which sometimes discharge volleys of stones across the track, the first halt is made at the *Pierre à l'Échelle*, $4\frac{1}{2}$ hrs. from Chamouni, so called from this being the place where a ladder used in the ascent is commonly deposited. This commands a fine view of the upper level of the Glacier des Bossons, over which the way next lies. The upper part of the glacier is enclosed between inaccessible precipices, down which masses of ice are constantly hurled

from the slopes of the Aiguille du Midi and the Mont Blanc du Tacul. On the opposite side rise the steep dark rocks of the Grands Mulets, well seen in all the views of this side of Mont Blanc, and even from the village of Chamouni. As it is not advisable to descend at once from the Pierre à l'Échelle to the glacier, the way lies for a short distance along the moraine, passing rapidly a spot where fragments of rock fall at intervals from the Aiguille du Midi. The Glacier des Bossons is always much crevassed, and it not seldom happens that the chief difficulty of the ascent is encountered here; but with the help of a ladder and the practical skill of the guides the traveller is not called upon for more than a reasonable degree of steadiness in awkward places, which he should have acquired by some previous practice. The most difficult part is usually found on the farther side, where the ridge of the Grands Mulets being continued under the bed of the glacier, the ice is broken up into séracs, and intersected by crevasses of unusual width. After accomplishing the ascent to the upper level of the névé which feeds the Glacier de Taconnay, the traveller in 2, or 3 hrs. from the Pierre à l'Échelle reaches the *Grands Mulets*, where, near the top of the first projecting mass of rock, a small hut (10,013') has been constructed for the convenience of those who pass here some part of the night. The beautiful chromo-lithographic plates of Mr. Coleman's 'Scenes from the Snow Fields' give a lively impression of the scenery of the upper part of the Glacier des Bossons, and of the views from the Grands Mulets, and may suggest to many who may object to the labour and expense of the ascent of Mont Blanc the advantage of coming so far on the way, and spending a night on the Grands Mulets. The cabane cannot be recommended as a sleeping-place, as it is extremely limited in point of space, and the numerous fleas make up for long fasting by un-

usual activity. It was formerly usual to start from hence about 2 hrs. before daylight, but of late years, since the guides have become familiar with the route, the practice has been to commence the ascent to the summit at a still earlier hour, and several recent travellers have left the Grands Mulets about midnight. The advantage of this arrangement is that the snow is usually in better order, and the fatigue of the ascent proportionately diminished, and that by reaching the top earlier there is a better chance of a clear view; but, on the other hand, the traveller loses some of the finest effects when he makes nearly the entire ascent by the faint light which the snow emits even on dark nights, and the cold is usually severely felt by those who reach the upper peak of the mountain soon after sunrise. More than half-way in the ascent from the Grands Mulets to the Grand Plateau is a nearly level and uniform field of névé called the Petit Plateau, followed by a steeper slope traversed by a great crevasse, usually half choked with snow and ice, which leads to the *Grand Plateau*. This is of considerable breadth, fully an hour's walk when the snow is soft. It lies immediately below the highest peak of Mont Blanc, between the Dôme du Gouté and the range of the Mont Maudit. From 3 to 4 hours are generally consumed in reaching this stage in the ascent from the Grands Mulets. Here, at a height of 12,900 ft., Messrs. Martins, Bravais, and Le Pileur pitched their tent in July 1844, and remained three days and nights engaged in scientific observations. Between the Grand Plateau and the summit is a range of steep rocks, the highest of any extent that are visible on the N. side of the mountain, called the *Rochers Rouges*, and the main difficulty of the ascent lies between the Plateau and the fields of névé above these rocks, which stretch without interruption to the summit. The earlier explorers followed a direct course to the rt. of the Rochers Rouges, but the ice-slope is steep, and

traversed by great crevasses, so that after fresh snow this way is always dangerous; and it was here that Dr. Hamel's three guides perished. The safer but circuitous course, devised by Messrs. Fellowes and Hawes, which has been generally adopted ever since, lies considerably to the l. of the Rochers Rouges, towards the depression between the peak of Mont Blanc and the Mont Maudit, and reaches the summit of that depression through a rather steep channel or ravine filled with snow, and called the *Corridor*. At the summit the traveller obtains the first view of Italy, with Monte Rosa and the Matterhorn in the eastern horizon. The way now lies up a steep convex slope of hard *névé*, called the *Mur de la Côte*. Here it is usually necessary to resort to the tedious process of cutting steps with the axe, until above the Rochers Rouges, where the modern route joins that by the so-called 'ancien passage,' the slope becomes more gentle, and this is no longer requisite. It is on this highest ridge of the mountain that most strangers, and not rarely some of the guides, show symptoms of exhaustion. Even those who feel no more serious inconvenience move more slowly, and are conscious of a languor which is not felt under similar circumstances at a lower level. In many cases the sense of exhaustion is such that men find it necessary to halt after every thirty or forty paces, and a certain degree of stupor comes on, which does not disappear till after they have rested for some time at the summit. In the last part of the ascent the calotte presents itself as a flattened dome of snow, gradually becoming steeper on either side, and at last contracted to a ridge. A group of rocks, which jut out through the snow, are called the *Petits Mulets*; from thence to the top the ascent takes a time disproportioned to the shortness of the distance and the gentleness of the slope, and the first feeling of those who are told that they have reached the summit is generally that of

relief from a load of ungrateful labour, rather than any more keen sense of enjoyment.

To describe the view, if that were possible, would little serve the traveller's purpose. His power of identifying the individual features of the immense panorama will depend upon his personal acquaintance with each district that comes within his range of vision; and here he who has previously explored many parts of the Alps, and made many minor ascents, has an immense advantage over the new comer, who is simply bewildered by the enormous extent and complexity of the mountain ranges that are laid out before him. It is now generally admitted that, however interesting the almost boundless panorama may be to one who has already acquired a good knowledge of the topography of the Alps, it is not equal in scenic effect to those obtained from many minor peaks.

The time necessary to reach the summit from the Grand Plateau depends mainly on the extent to which travellers are affected by the attenuated air of the upper region, but *cæteris paribus* it may be reckoned that the *rte.* by the *Corridor* involves a detour of from 1 to 2 hrs.; and when the snow is in good order, so as not to involve the risk of avalanches, there seems to be no good reason for not preferring the ancient and more direct route. Those who do not tarry long, and who commence the descent not later than 10 or 11 A.M., may under ordinary circumstances easily return to Chamouni on the same day, the time necessary varying according to the state of the crevasses from 6 to 8 hrs., exclusive of halts.

2. *The St. Gervais Route.* It has been already remarked, that the most obvious way of reaching the summit of Mont Blanc is by the ridge which connects it with the *Aiguille du Goûté*. Now that the way has been fully explored, it is probable that it will be frequently used.

The NW. face of the *Aiguille du Goûté*, which is the only accessible way to the

summit, is formed by a number of very steep parallel ridges of rock, rising vertically, with couloirs of ice or frozen snow between them. One of these couloirs, broader and more continuous than the rest, stretches from near the summit to the Glacier de Bionnassay, which lies at the base of the ridge. None of the ridges of rock is practicable throughout from the base to the summit, and the main objection to this route arises from the necessity for passing from one to the other across these couloirs, and more especially across the great central couloir. Owing to the steepness of the slope and the hardness of the ice, this is in itself not easy; but, from the crumbling condition of the top of the ridge, stones are frequently detached, which shoot down these channels with formidable velocity, and in hot weather, or after a storm, become a source of unavoidable risk, especially to the man engaged in cutting steps in the ice. The ascent may be made from St. Gervais, by way of Bionnassay and the N. bank of the glacier, or more easily from the inn above the Col de Voza. Turning to the S. a faintly marked path leads from the Pavillon de Bellevue along steep grass slopes, 'with a gradual ascent, as far as a ravine where Mont Lachat begins.' 'Ascending, and turning a little to the rt. on the opposite side of the ravine, a path, whose existence would never be suspected from above or below, traverses the precipitous side of Mont Lachat, on the Bionnassay side, at a great height above the glacier. This leads out into a barren rocky region, which is crossed in nearly the same direction, till the rt. bank of the glacier descending from the base of the Aiguille is finally reached just above the part where it begins to be much crevassed. This glacier is then traversed, turning sharply to the l. after the first ridge of rocks is passed, and keeping up the slopes or along the rocks, so as ultimately to reach a spot at some height above the rt. or NE. bank of the glacier, near to its origin, and immediately under the Aiguille du Goûté.' 'Here is the

ruined cabane of M. Guichard, with a striking view of the Aiguille de Bionnassay on the opposite side of the glacier, and from this point begins the ascent of the actual Aiguille du Goûté.' —[F. V. H.]

The ruined cabane may be reached in 4 hrs. from the Col de Voza, or in 6 hrs. from St. Gervais. The ascent of the Aiguille, under favourable conditions, may be accomplished in $2\frac{1}{2}$ hrs., and it depends altogether upon circumstances whether this is merely an agreeable scramble, or an operation of some difficulty, involving a certain unavoidable amount of danger, when the couloir is crossed during the fall of stones from above. On the summit of the *Aiguille du Goûté* (12,530'), a small wooden cabane was erected by the St. Gervais guides a few years ago, with a view to facilitate the ascent. This, which is by many degrees the highest dwelling in Europe, is by no means snow-proof, and the floor is often coated with ice, so that those who mean to pass the night should bring ample covering, which should be partly waterproof.

It has been already explained that, although very steep on three sides, the Aiguille du Goûté is connected by a continuous ridge with the Dôme du Goûté, and this with the summit of Mont Blanc through the Bosse du Dromadaire. In fine weather the passage of this ridge presents no real difficulty, and it is not easy to point out any other route at nearly so great a height which involves so little labour either in ascending or descending. Fine weather is, however, an indispensable condition, as on this exposed ridge a moderate degree of wind is unbearable, and clouds gathered round the Dôme du Goûté may make it impossible to follow the true direction. This alone explains the fact that the completion of this route, though so long a matter of interest, was so long delayed. In the preceding pages it has been seen that the two courses here described as the Chamouni and St. Gervais routes are connected together by the slope which leads from

the Grand Plateau to the Dôme du Goûté ; but, now that the direct way is better known, it may be assumed that no one in fine weather will think of taking any other from the Aiguille du Goûté to the top. In returning it is easy to vary the way by descending to Chamouni by the Grands Mulets.

The advantages of the two routes are pretty equally balanced, and will be differently appreciated under different circumstances, and according to the taste of each traveller. On the St. Gervais route the most laborious and difficult part of the expedition is encountered on the first day, in reaching the summit of the Aiguille du Goûté. The ascent from thence commands distant views, continually increasing in grandeur and extent, and the summit is reached, without fatigue, in $3\frac{1}{2}$ to $4\frac{1}{2}$ hrs. By the Chamouni route the ice-scenery is far more striking, and the cabane at the Grands Mulets affords better shelter at night than that on the Aiguille du Goûté. Probably the best arrangement is to go by the St. Gervais route, and return by the Grands Mulets; though late in the season, when the crevasses of the Glacier des Bossons present a far more serious obstacle than in the early summer, there is some risk of long delay in finding a passage across that glacier. The Chamouni guides, who have now reduced their demand for the ascent by the direct route to 70 francs each, which includes the payment of such porters as they employ to carry necessaries to the Grands Mulets, require 100 francs each for the St. Gervais route, and expect the traveller to pay the porters who are taken to the Aiguille du Goûté.

ROUTE H.

CHAMOUNI TO MARTIGNY.

A large proportion of the strangers who visit Chamouni either go or return by way of Martigny, and have to choose between three routes very different in character, two of which are amongst those most frequented by ordinary tour-

ists. In the Alps it is a great mistake to suppose that what is common is necessarily commonplace; and, in truth, the greater part of both the beaten tracks here described abound with interesting and pleasing scenery. A good walker, not bound for Martigny, may spend a day very agreeably, and combine the best portions of both routes, by going from Chamouni to the Tête Noire, and returning by the Col de Balme. He would require a guide to find the direct way from the Tête Noire to the col.

1. *By the Col de Balme.*

	Hrs.' walking	Eng. miles
Argentière . . .	$1\frac{1}{2}$	$5\frac{1}{2}$
Col de Balme . . .	$2\frac{1}{4}$	6
Forclaz . . .	$2\frac{1}{4}$	$5\frac{1}{2}$
Martigny . . .	$2\frac{1}{4}$	6
	<hr/> 8 $\frac{1}{2}$	<hr/> 23

The village of Chamouni being nearly 2,000 ft. higher than Martigny, an average walker will employ fully 9 hrs., exclusive of halts, in making the pass from Martigny, while in the opposite direction 8 hrs. suffice. There is a char-road from Chamouni to Argentière. Charge for a guide from Martigny to the Col de Balme, 8 fr.; to Chamouni, 12 fr. The same charge is made for a horse or mule. For the Chamouni tariff, see Rte. A. By an arrangement professedly founded on mutual jealousy, but in reality upon a common desire to extract the largest practicable sum from the pockets of strangers, the Chamouni guides and mules do not go beyond Martigny, nor those of Martigny beyond Chamouni; and as they are respectively forbidden to take travellers on the territory of the rival commune, no stranger can avail himself of return guides or mules. In fine weather a guide is quite unnecessary to any one having a little experience in mountain travelling, and except in clear weather, the route by the Tête Noire is in every way to be preferred.

After leaving on the l. hand, at about 2 m. from Chamouni, the path to the Flegère (Rte. A), the road to Argentière mounts through a defile,

traversing a fine forest wherein stands the hamlet of *Tines*; a little farther on it crosses the Arve, and returns to the l. bank before reaching

Argentière (Inn: Bellevue, tolerable), near the lower end of the great glacier bearing the same name, the vast extent of which cannot, however, be guessed when it is merely seen from below. (See Rte. L.) Above *Argentière* the valley is bare, the forests having been gradually destroyed by storms and avalanches, and perhaps still more by the carelessness of the inhabitants; but cultivation extends as far as the hamlet of *Le Tour*, 2 m. beyond *Argentière*, near the termination of the *Glacier du Tour*, the most easterly of the great glaciers of *Mont Blanc* that flows into the valley of *Chamouni*. From hence the ascent to the col passing the châteaux of *Charamillan* is continuous, but nowhere steep, lying over grassy slopes and the débris of a black friable slate, a member of the carboniferous series, which fills the greater part of the trough between the crystalline range of *Mont Blanc* and that of the *Aiguilles Rouges*. The ridge which closes the NE. end of the valley of *Chamouni* is a prolongation of that separating the *Glacier du Tour* from the *Glacier de Trient*. NW. of the *Col de Balme* it rises into a peak of crumbling rock called the *Croix de Fer*, whereon M. Escher, of *Zurich*, was dashed to pieces by a fall over the precipice when attempting the ascent in 1791.

On the summit of the *Col de Balme* (7,231') is a stone marking the boundary of the *Valais* and *Savoy*, and close to it a mountain inn, where refreshment and tolerable beds are supplied at rather high prices. The view from the col is justly celebrated, and in fine weather this route should always be preferred by those who approach *Chamouni* from the *Valais*, as the effect of the grand range of *Mont Blanc* seen from its nearest summit, the *Aiguille du Tour*, to the *Aiguille du Gouté*, with the opposite mass of the *Aiguilles Rouges*, is enhanced by the charm of surprise when

it is suddenly unrolled before one who ascends from the narrow gorge of *Trient*. To the NE., over the *Forclaz*, the range of the *Bernese Alps* between the *Diablerets* and the *Jungfrau* forms a distinct portion of the panorama. It is worth while to ascend from the col to a point about $\frac{1}{4}$ hr. towards the NW., whence the view is still more extensive.

Some travellers sleep at the *Col de Balme* for the sake of seeing the sunrise, but the effect of sunset is preferable, and it is quite possible to reach *Chamouni* on the same night.

A pedestrian who does not fear to lengthen his day's walk by fully 2 hrs. may descend in $1\frac{1}{2}$ hr. from the col to *Valorsine* on the route of the *Tête Noire*, and so combine on the way to *Martigny* the most interesting parts of both routes.

The descent by the ordinary track from the *Col de Balme* to the village of *Trient* is much steeper than the ascent from *Argentière*, but it has been so much improved that there is no risk in riding up or down. The châteaux of *Herbagères*, nearly $\frac{1}{2}$ hr. from the summit, command a fine view of the *Glacier de Trient*, which closes the series of glaciers that drain the NW. flanks of the *Mont Blanc* range. The forest through which the steepest part of the descent is carried has been thinned and partly carried away by avalanches; at its base are some meadows where the track joins that from the *Tête Noire*, crosses the stream descending from the glacier, and bearing the same name, before reaching the wretched village of *Trient*, which has a very poor and dirty inn. The natural course to the valley of the *Rhone* would have been to follow the torrent of *Trient* to its junction with the main valley, and this is in truth the most interesting, though longer, route (see below); the direct way crosses the low ridge E. of the village, and follows a nearly direct line down a lateral valley of the *Dranse*.

The *Forclaz* pass, sometimes called *Col de Trient* (4,997'), is reached by a good path in $\frac{1}{2}$ hr. from *Trient*. At the

summit is a little inn, and here the authorities of the Canton Valais levy, or did levy, a toll upon all strangers on the discreditable pretext of a charge for the visa of passports, which are not required by the Federal government of Switzerland. About $\frac{1}{4}$ hr. below the pass the track turns to the l. and opens a vista of vast extent along the course of the Rhone from Martigny to beyond Sierre, and even to its source in the Rhone Glacier below the pass of the Furka. The uniform slope of the mountains on either side makes this and other views of the valley of the Rhone less interesting than they would otherwise be. The descent lies through a pleasant valley, tolerably well planted, and the change of climate is very marked on reaching the region of vines and chestnuts through which the path winds, till in $1\frac{3}{4}$ hr. (descending) it joins the main road of the valley of the Dranse at Martigny le Bourg, and 1 m. farther, passing under an avenue of fine trees, reaches *Martigny*, called for distinction *Martigny la Ville* (Inns: Hôtel Clerc; Grande Maison; Le Cygne; H. de la Tour), described in § 18, Rte. A.

2. *By the Tête Noire and Trient.*

	Hrs.' walking	Eng. miles
Argentière . . .	$1\frac{3}{4}$	$5\frac{3}{4}$
Tête Noire . . .	$2\frac{1}{2}$	8
Forclaz . . .	$1\frac{3}{4}$	$3\frac{1}{4}$
Martigny . . .	$2\frac{1}{4}$	6
	<hr/>	<hr/>
	$7\frac{3}{4}$	23

Although somewhat longer than the *rte.* by the Col de Balme, this requires less time. About $7\frac{1}{2}$ hrs. suffice when it is taken from Chamouni, and $8\frac{1}{4}$ hrs. in the opposite direction. Including halts, mules take about 10 hrs. by either *rte.* Charge for a guide from Martigny—6 fr. to the Tête Noire; 12 fr. to Chamouni; 1 fr. extra for a visit to either the Barberine or the Poyaz waterfall.—The same charge for a horse or mule.

A line drawn from near Servoz to Vernayaz in the valley of the Rhone, through the valley of the Dioza and the Val Orsine, marks a depression parallel to that of the valley of Chamouni, from

which it is separated by the range of the Aiguilles Rouges and the Brévent. N. of Argentière this barrier subsides to a low ridge, traversed by a much frequented mule-path, which turns off close to the village, crosses the Arve, and ascends over rough ground past the hamlet of *Tréléchant* to the summit called *Les Montets* (5,037'). After a slight descent, the head of the Val Orsine, sometimes called *Val de Bérard*, opens on the l. near the hamlet of Poyaz, and shows the snowy summit of the Buet. [A fine waterfall, the *Cascade de Poyaz*, may be reached in $\frac{1}{2}$ hr. It lies near to the track through the Val de Bérard by which the ascent of the Buet is commonly made, and better deserves a visit than many of more celebrity. The *Eau Noire* here breaks through a mass of huge granite rocks piled together in the wildest confusion, and springs over a ledge 50 ft. in height into a dark basin. A small house has been built near the fall, where refreshments are ready to tempt the traveller.]

An easy descent of 1 hr. leads from the summit to *Valorsine* (no decent inn), the last village in Savoy, much exposed to avalanches. A massive stone bastion is raised to protect the village church from their destructive force. A little farther the track crosses to the rt. bank of the Eau Noire, near the junction of the Barberine torrent with that stream. [Another fine waterfall, called *Cascade de la Barberine*, much higher, but less singular than that of Poyaz, is often visited by travellers. It lies about $\frac{1}{2}$ hr. from the mule-track, and a comfortable little inn, *Ala Cascade*, has been opened at the point where the path leading to the fall turns off.] A traveller can have no difficulty in finding, in case of need, a local guide to show the way to either of the waterfalls above mentioned. The defile of the Eau Noire through which the way now lies has been compared to the Via Mala, but is perhaps more beautiful in its details, though on a less grand scale. It lies between the *Gros Perron* and *Bel Oiseau*, which rise above

the l. bank, and the *Posettes*, forming the N. extremity of the range of the Croix de Fer, on the rt. bank. A gate with the remains of a small redoubt marks the Swiss frontier, and some distance farther on, nearly 1 hr. from Valorsine, is a short tunnel, called La Roche Percée, through a projecting point of rock which nearly closes the defile. This is within 5 min. of the *Tête Noire* (3,917'), where are two small inns. That called Hôtel de la Tête Noire is clean and well kept, and a day or two might be very pleasantly spent here in exploring the beautiful scenery of the neighbourhood.

The junction of the Trient torrent with the Eau Noire is not seen from this etc., as the path turns out of the defile and enters the valley of Trient, carried nearly at a level, through a pine forest at a considerable height above the stream. The village of Trient is reached in $\frac{3}{4}$ hr., the path from the Col de Balme being met on the l. bank of the torrent, a short way from the bridge. The way to Martigny by the Forclaz has been already described.

3. By the *Tête Noire* and *Salvent*.

	Hrs.' walking	Eng. miles
Tête Noire . . .	4 $\frac{1}{2}$	13 $\frac{1}{2}$
Trinquent . . .	2	5
Salvent . . .	1	2 $\frac{1}{2}$
Martigny . . .	1 $\frac{1}{2}$	4
	$9\frac{3}{4}$	25

The glen of the Trient, which descends from the Tête Noire to Vernayaz in the valley of the Rhone near Martigny, offers a more interesting, but rather longer and more laborious way than that by the Forclaz. The path being rough is better fitted for foot-passengers than mules, but the way deserves more notice than it has yet received from tourists. One who does not fear a long day's walk cannot approach Chamouni better than by taking this way from Martigny to the Tête Noire, and then following a mountain path, for which he should secure a local guide, leading direct from thence to the Col de Balme. This way would require from 10 $\frac{1}{2}$ to 11 hrs.' steady walking exclusive of halts.

'On leaving the inn at Tête Noire the path to Salvent crosses to the l. bank of the stream, and after passing a few houses, ascends by a steep zigzag to a considerable height on the l. side of the Val de Trient, overlooking the upper part of the valley, which, from the height to which the path ascends, looks like a narrow black trench, and the distant view of Mont Blanc filling up the depression in the side of the valley of Chamouni, through which the road of the Tête Noire passes, is also very fine. Curious examples of "glacier markings," interesting to the geologist, may be observed on the rocks of this valley. The path continues for a long time at nearly the same elevation, affording fine views of the valley of Trient, and skirting at times fearful precipices, at others running through smiling pasturages, and passes the villages of *Finhaut*, *Trinquent*, and *Salvent*; beyond which it leaves the inaccessible gorge through which the Trient pours into the valley of the Rhone a little to the rt., and descends by a pretty little well-wooded valley upon the village of *Vernayaz*, 2 m. from Martigny. The scenery is very fine throughout, and the path well made, and may be found without a guide. Between Trinquent and Salvent a romantic little bridge is passed, similar, and at least equal in beauty of situation to the Pantenbrücke in the Lint-thal. The auberge at Finhaut is a miserable place, and afforded nothing but wine and *pain de seigle*; but the village itself is charmingly situated.'—[M.]

ROUTE I.

CHAMOUNI TO ORSIÈRES, BY THE COL DE CHAMPEY.

Mule-path, 14 hrs.' walking.

This is a very interesting and agreeable route, far superior in scenery to that by Martigny, and it is surprising

that it should not be more frequented by pedestrians. The entire distance is, however, rather much for a single day's walk, and it is better to sleep at the Tête Noire or the Col de Balme.

Having reached the summit of the Forclaz by either of the ways described in the last Rte., the traveller takes a path to the rt. close to the little inn, and ascends gradually amid pastures and pine trees to a point between the châteaux of La Giète and Bovine, commanding a view similar in character but more extensive than that from the Forclaz. It reaches on one side to the E. end of the Lake of Geneva, and includes a great part of the chain of the Bernese Alps. By mounting a little above the path the peak of the Grand Combin is brought into view. At the châteaux of Bovine 160 cows are kept during the summer. On leaving them the path winds round a corner of the mountain, turns to the rt., and descends by steep zigzags to cross a torrent by a plank bridge. The way then lies through meadows and pine forest, amid beautiful near scenery to the *Col de Champey*. The view here, overlooking the secluded *Lac de Champey*, fringed with pine forest, and backed by the noble peak of the Grand Combin, is extremely picturesque. The mass of the *Mont Catogne* separates the pass and the lake from the valley of the Dranse and the road of the Great St. Bernard, and the summit must command one of the finest panoramic views in this part of the Alps. The Col is accessible from Bovernier between Martigny and Sembranchier (§ 18, Rte. A), so that it may be taken by a traveller going from Martigny to Orsières, though involving a detour of about 3 hrs.

The descent from the lake is rapid, and soon leads to the char-road between Orsières and Issert (Rte. K). The descent may be made in 1 hr., but nearly 2 hrs. are required to reach the lake from Orsières.

The above notice is chiefly taken from the 'Alpine Journal,' No. 1.

ROUTE K.

ORSIÈRES TO COURMAYEUR, BY THE COL DE FERREX.

	Hrs.' walking	Eng. miles
La Foliaz . . .	2½	7
Col de Ferrex . . .	2½	5½
Praz Sec . . .	2½	5½
Courmayeur . . .	2	6
	<hr/> 9	<hr/> 24

The line of depression extending parallel to the crystalline range of Mont Blanc from the Col de la Seigne to Orsières is partially interrupted by a ridge which connects the Mont Dolent with the minor range of carboniferous schists, whose principal summit is La Grande Rossère. Over this ridge lies the pass of the Col de Ferrex, or Ferret, practicable for mules, and frequented by those who make the tour of Mont Blanc, or who wish to take the shortest way from Martigny to Courmayeur. A second pass, nearer than the principal Col to Mont Blanc, and steeper but rather shorter, is called the *Petit Ferrex*. This is not much frequented by strangers, because the view of the Allée Blanche is inferior, and it is not passable for mules. The valley on the NE. side of the Col, lying in Swiss territory, and the portion of the Allée Blanche between the pass and Entrèves, are both known by the name *Val Ferrex*. The view from the Col is in clear weather very interesting, but in other respects the scenery of this route is not quite equal to that of the other passes in the neighbourhood of Mont Blanc.

From Orsières the way to the Col lies on the l. bank of the Dranse, soon reaching the junction of the Dranse de Ferrex with the Dranse d'Entremont, which descends from the Great St. Bernard. A char-road extends to the village of Issert, the chief place in the valley, rather over 2 m. from Orsières, passing on the way the turn to Champey and Trient (Rte. I). The Swiss Val Ferrex contains many hamlets, and appears fertile and well planted with fruit trees; but although it presents an

agreeable contrast to those who descend into it from the glaciers described in the following routes, the scenery is not of a striking character. The first hamlet is *Praz-le-Fort*, between which and *Branche*, about $\frac{1}{2}$ m. farther, the stream from the *Glacier de Saléna* (Rte. M) joins the *Dranse*. Beyond *Branche* the two small glaciers of *Planereuse* and *Trubzuc* are seen hanging over the NW. side of the valley, and the path, which since *Praz-le-Fort* has kept to the rt. bank, mounts more rapidly to *La Foliaz*, also called *La Folie*, a group of châteaux, in one of which refreshments and beds may be procured. Nearly opposite, in the midst of a larch forest, is the opening of the *Glacier de la Neuva* (Rte. L). Nearly $\frac{3}{4}$ hr. farther on are the *Châlets de Ferrex*, where it is said that rather better quarters are to be found than at *La Foliaz*. Here a track bears to the l. to the *Col de la Fenêtre*, leading to the *Great St. Bernard* (§ 18, Rte. B). [The track to the *Petit Ferrex* keeps to the rt. from the mule-path, mounts by a steep declivity, called the *Grapillon*, and rejoins the main path at *Pré du Bar*.] The mule-path mounts over the remains of a great landslip, which in 1776 covered the pastures of *Banderai*. The way here lies among jurassic limestone rocks, small patches of which, the remains of extensive deposits removed by denudation, are found overlying the carboniferous strata that surround the crystalline mass of *Mont Blanc*.

The last part of the ascent is steep, and $1\frac{1}{2}$ hr. from the *Châlets de Ferrex* is required to reach the *Col de Ferrex* (8,176'), a depression in the ridge connecting the *Mont Dolent* (12,566') with a summit which on the Piedmontese map is called *Le Grand Goile* (10,630'). The view extends along the *Allée Blanche* to the *Col de la Seigne*, and includes the series of glaciers which stream down the flanks of the *Mont Blanc* range, eight or nine of which are visible from this point. The *Grandes Jorasses* (13,496'), here presenting a very grand appearance, and the *Géant*, conceal the main peak, which

is not seen till more than half the descent has been accomplished. In the E. the *Vélar*, and to the NE. some peaks of the *Bernese Alps*, complete the view.

The eastern portion of the *Allée Blanche*, or *Piedmontese Val Ferrex*, is far wilder and more rugged than the Swiss side of the pass. Avalanches and bergfalls have destroyed most of the timber and ruined pastures and châteaux. One of the most considerable on record destroyed, in 1728, a group of châteaux called *Pré du Bar*, near the base of the *Glacier du Triolet*. The track lies over soft slaty soil, in which the rains cut deep trenches, and for some distance is carried along the S. slope of the valley, at a great height above the torrent, passing a cross which serves to guide those who approach the *Col* from *Courmayeur*. Several groups of very miserable looking châteaux are passed. The chief of these are called *Sagion*, *Praz Sec*, and *Plan Pansier*. The latter lies on the rt. bank of the stream, but before reaching *Entrèves* the path returns to the S. side of the valley, and passing under the *Mont de la Saxe*, reaches *Courmayeur* (Rte. B) in 4 hrs. from the *Col*. Nearly 5 hrs. are required when the ascent is made on the *Piedmontese* side.

ROUTE L.

CHAMOUNI TO ORSIÈRES, BY THE COL D'ARGENTIÈRE.

This is the highest pass which has yet been effected across the range of *Mont Blanc*, and one of the most difficult. The summit is easily reached from the *Glacier of Argentièr*, but the descent on the SW. side should be attempted only by practised mountaineers. The pass was first discovered by *Auguste Simond*, and the summit was reached in 1860 by Messrs. *Tuckett* and *Wigram*, but the passage was first effected in the following year by *Mr. Stephen Winkworth*, accom-

panied by Auguste Simond and his son François, and by Tobie Simond. The editor has been favoured with further particulars by Mr. A. A. Reilly, who crossed in 1862.

The *Glacier d'Argentière*, perhaps the greatest, and certainly one of the most beautiful glaciers of the Mont Blanc range, descends nearly at right angles to the valley of Chamouni, between the range extending from the *Aiguille de Triolet* through the *Tour des Courtes* (12,119') and the Aig. Verte (13,432') to the Aig. du Dru (12,500'), and that which includes the *Aig. de Chardonnet*, the *Aig. d'Argentière* (13,186'), and the *Tour Noire*. The head of the ice-valley bends somewhat to the S., while the way to the pass lies more nearly SE., across the ridge extending from the Tour Noire towards the Mont Dolent. The latter peak (12,566'), projecting from the main range towards the Col de Ferrex, is apparently overtopped by many points in the interior part of the range enclosing the Glacier d'Argentière.

Mr. Winkworth ascended from Lavanchy to the Châlets de l'Ognon, where he passed the night. The path mounts to a point near the Chapeau, then bears to the l., nearly all the way amid pine forest, till it reach an open space where it crosses a stream from the *Glacier de la Pendant*, lying on the N. flank of the Aiguille du Dru. The châteaux lie near the NE. end of that glacier, at some height above the ice-fall of the Glacier d'Argentière, and are not inhabited till the month of July. A path is carried for some distance from the châteaux along the slope of the mountain, which is one of the buttresses of the Aiguille du Dru, and in consequence of the crevassed condition of the middle part of the Glacier d'Argentière, it is not advisable to take to the ice until more than 1 hr. from the châteaux, where a lateral branch from the NE. side of the Aiguille Verte joins the main stream. The last-mentioned magnificent peak here rises direct from the glacier basin, white to the summit, yet so steep that it

is wonderful that snow or ice can cling to it. After crossing the branch from the Aiguille Verte, the traveller reaches the upper level of the glacier, which is of great extent, and surrounded on all sides by a barrier of precipices. The range between the Aiguille Verte and the Aig. de Triolet is, for the most part, bare rock, save where it is streaked by snow couloirs. On the opposite side, between the Aig. d'Argentière and the Aig. de Chardonnet, is a lateral glacier, steep and crevassed, but perhaps not impassable, over which a pass may perhaps be made to the Glacier du Tour.

'The ice-stream from the Col d'Argentière descends in a mass of irregular *séracs*, alternating with slopes of névé, from a snow-ridge guarded on the N. side by the Tour Noire, and to the S. by a similar peak which is joined to the Mont Dolent by a steep and serrated ridge. The stream is bounded on the l. side (ascending) by a buttress of the Tour Noire, and on the rt. by two masses of rock which crop out from the glacier like the Grands and Petits Rognons.'—[A. A. R.] In ascending the traveller may choose between the ice, which is a good deal crevassed, and the rocks on the l., rich in crystals of brown quartz, which in some places keep up an irritating fire of small stones.

The *Col d'Argentière*, 12,556 ft.? in height, may be reached in 6 or 7 hrs. from the châteaux. It commands a magnificent view towards the E., in which the Grand Combin, the Dent Blanche, and the Weisshorn are conspicuous. The slope on the Argentière side of the Col is not very steep, but the sheer descent on the opposite or E. side is positively startling. Immediately below the Col is the couloir by which (as described in 'Peaks, Passes, and Glaciers') Mr. Winkworth made the descent. To the l. of this is a projecting spur of rock, between which and the Tour Noire, in a deep hollow not seen from the top, lies a small and very steep glacier. The descent by the couloir is often impracticable, and at all times difficult and rather dangerous.

Mr. Reilly and his companions effected a descent by the N. side of the spur of rock above mentioned, but found the glacier between it and the Tour Noire so difficult that they were forced to make a circuit round its head, immediately under the precipitous rocks of the Tour Noire, not without considerable difficulty and some danger from falling rocks. He advises future travellers to keep along the ridge of the rocky spur till they have got below the more difficult part of the lateral glacier; it is not, however, certain that fresh difficulties may not attend that course.

The *Glacier de la Neuva*, which unites the several ice-streams descending from this part of the range, flows about due E. towards the Swiss Val Ferrex. Its chief affluent lies to the N. in a recess of the range E. of the Tour Noire. At the head of this branch of the glacier is a tempting Col, which has been reached by some mountaineers seeking a pass to the Glacier d'Argentièrè. It overlooks, however, the head of the Glacier de Saléna, and the descent on the N. side did not appear practicable.

The descent to the Val Ferrex must be completed by the long and wearisome moraine on the l. bank of the Glacier de la Neuva, as the ice is much crevassed, and the Alpine pastures, which promise a more agreeable way, are cut off by precipices from the lower valley. The glacier and its moraine come to an end in a stony tract not far from the Val Ferrex. Some trouble is experienced in crossing the impetuous torrent, which is the head of the Dranse de Ferrex, before reaching the chalets of La Foliaz (Rte. K).

By taking this pass from La Foliaz a traveller would have the advantage of encountering all his troubles in the ascent, when, in case of need, the retreat is more easily effected.

ROUTE M.

CHAMOUNI TO ORSIÈRES, BY THE GLACIER DU TOUR.

The *Glacier du Tour*, which is the easternmost of the great glaciers that flow into the valley of Chamouni, gives access to two considerable glaciers that descend to the Val Ferrex, each of which affords a practicable pass across the E. end of the Mont Blanc range. Its upper extremity has not, however, been thoroughly explored, and it is not known whether a direct pass to the Glacier of Saléna may there be effected, nor whether the depression between the Aiguille de Chardonnet and that of Argentièrè mentioned in the last Rte. is accessible on this side. The first recorded passage from the Glacier du Tour to that of Saléna was made by Professor Forbes in 1850, but the pass is said to have been discovered many years before by a native of Chamouni. The same pass was again made in 1857 by Mr. Alfred Wills, with two friends, accompanied by the late Auguste Balmat and François Cachat, as guides; and those who intend following the route will not fail to read the very interesting description given by Mr. Wills in the first series of 'Peaks, Passes, and Glaciers.' Though extremely interesting, the pass by the Glacier of Saléna is both difficult and circuitous, and of late the descent to Orsières has usually been effected by the much easier and more direct way of the Glacier d'Orny. A rough idea of the relative position of the four chief glaciers which occupy the upper valleys of the NE. end of the Mont Blanc range may be formed if we first fix our attention on a great plateau of névé lying E. of the Aiguille du Tour. This is drained by two glaciers which flow at rt. angles to each other—the *Glacier du Trient* descending N., and the *Glacier d'Orny* to the E. The angle formed by these glaciers lies within another right

angle, formed by the glaciers of Tour and Saléna; but while the two first start from the same level, the upper part of the Glacier du Tour lies at a great height above the Glacier de Saléna, and as yet no pass has been effected direct from the one to the other. S. of the Aiguille du Tour there is an opening in the ridge forming the E. boundary of the Glacier du Tour, and this gives easy access to the plateau at the head of the Glacier d'Orny, which at the same time affords the only means yet known for reaching from the N. the Saléna Glacier, through the pass called the Fenêtre de Saléna.

The Glacier du Tour is easily reached from the little inn on the Col de Balme. A short but steep ascent leads to the ridge which overlooks the E. bank, and on descending from thence to the side of the glacier it is possible to mount for $\frac{1}{2}$ hr. along the rocks before taking to the ice. The whole middle region is much crevassed, the difficulties varying, as usual, with the season and with the condition of the snow, which usually covers all but the wider crevasses. Professor Forbes and Mr. Wills, in the passages above referred to, ascended the glacier for a considerable distance beyond the Aiguille du Tour, nearly to the base of the Pointe des Plines; but in a subsequent expedition Mr. Wills ascertained that it is a much easier and more direct course to pass through a gap immediately S. of the Aiguille du Tour, leading directly to the great plateau which forms the common source of the Glaciers of Trient and Orny. The direct course to Orsières now lies due E., and on reaching the slightly convex summit of the plateau (11,213') a very fine distant view of the Bernese Alps gives an unexpected interest to the pass. The descent of the Glacier of Orny offers no unusual difficulties, and from its base a short glen leads to the Val Ferrex, at a point between Praz le Fort and Issert, about 4 m. from Orsières. 'Time from the Col de Balme to Orsières, 11 hrs.'—[A. M.]

Longer and more difficult, but also

more interesting, is the route by the Glacier of Saléna. The S. end of the plateau already mentioned is fenced in by a shattered range of aiguilles, through which an extremely narrow opening, not more than 5 ft. wide and about 11,200 ft. in height, forms the pass. The scene exhibited from this singular point of view, which Mr. Wills has well named *Fenêtre de Saléna*, is remarkable, not for the distant view, for the Vêlan is the only high summit seen, but for the grand range of crags and aiguilles that enclose the head of the Glacier de Saléna. The southern barrier includes a massive snowy peak, which Mr. Wills compares to the Grandes Jorasses, and which apparently has not been measured. At the E. end of the glacier basin is a range of dark crags, of which the highest summit is the *Pointe des Plines* (12,835'). Between these two masses the SW. angle of the glacier runs up into a deep recess approaching the Aiguille d'Argentière. This recess has not been examined, but may probably lead to a pass E. of that peak, and communicating with the head of the Glacier du Tour. The most remarkable portion of the view from the Fenêtre is the range enclosing the N. side of the glacier, happily named by Professor Forbes *Aiguilles Dorées*. They consist of a succession of ruddy yellow pinnacles of great height, whose natural colour is enriched by their exposure to the full blaze of day, when the traveller is favoured by fine weather, and without which such a pass should not be attempted. Between the gaps of the range small tributary glaciers and ice couloirs stream down, and by contrast heighten the effect of the scene.

A steep descent leads from the Fenêtre to the upper level of the Glacier de Saléna. This is separated from the long lower reach of the glacier, extending nearly to the Val Ferrex, by a great ice-fall, where, in the course of a rapid descent of about 1,500 ft., the glacier is compressed into a narrow channel between a spur projecting from the base of the Aiguilles Dorées and the great

range which walls it in on the S. Mr. Wills and his companions made the attempt to cross the ridge projecting from the Aiguilles Dorées, and descend its steep E. face along the l. side of the glacier; but, although he does not consider this impossible, the lateness of the hour at which the attempt was made deterred them from persevering, and they followed the same course which had been taken by Professor Forbes, and has since been adopted by others. This lies on the rt. side of the ice-fall, and involves the descent of a very steep and high rocky slope, partly covered with rhododendron and other Alpine shrubs, whereon Mr. Wills and his party bivouacked. The objection to the passage along this side of the valley lies in the presence of several small tributary glaciers overhanging the S. bank of the main glacier, which, especially during the afternoon, discharge blocks of stone of various sizes, in numbers sufficient to make the passage somewhat hazardous. On reaching the lower level of the glacier below the ice-fall, it is expedient to cross the glacier to its N. bank, whence a steep and long descent leads down to the Val Ferrex. A barrier of pine-forest lies between the lower end of the glacier and the valley, and almost completely cuts off all view of the former from the neighbourhood of Praz le Fort, where the route joins the main track of the Val Ferrex (Rte. K).

SECTION 17.

SIXT DISTRICT.

It has been remarked in the introduction to § 12, that the limestone ridges lying between Chambéry and the valley of the Arve form an extension to the SW. of the geological formations which characterise the range of the Bernese Alps. The connection is orographical as well as geological, and the range of the Dent du Midi, the Buet, and the Rochers des Fys, supplies the link be-

tween them. It will be observed, as something more than an accidental coincidence, that a nearly continuous line of valley extends from Grenoble to the Rhone near Martigny, and nearly follows the line of separation between the secondary and the older rocks. This line of depression is marked by the Isère from Grenoble to Albertville, and by the Arly from thence to Megève. Descending to the Arve, and partly following that stream to Servoz, it then mounts along the Dioza to the Col de Salenton, and, following the Eau Noire and the Trient, reaches the Rhone near Martigny.

In the present section we include the chain of the Buet, above alluded to, and the mountain-district lying to the NW. between the Arve and the Lake of Geneva. The lower ridges, although occasionally parallel to the principal range, are for the most part very irregular in their form and direction—a circumstance which, perhaps, contributes to the variety of scenery for which the district is remarkable. The valley of Sixt, lying W. of the Buet, is, for the mountaineer, the natural centre of the district. It abounds in grand and beautiful scenery, but the accommodation at Sixt is not yet worthy of the position. Much better quarters are found at Samoëns, lower down in the valley. A good inn has been opened at Champéry, near the base of the Dent du Midi (Rte. H), and is deservedly frequented, as it combines a fine position with the advantage of easy access by railroad, to Geneva, Sion, &c. The rugged range of the Dents d'Oche, near the E. end of the Lake of Geneva, deserves more attention than it has received. The higher summits command noble views of the high Alps on one side, and of the Lake of Geneva on the other.

ROUTE A.

GENEVA TO SIXT, BY TANNINGES.

The valley of Sixt is accessible by a pretty good carriage-road as far as Sa-

moëns, but the way from thence to Sixt is fitted rather for charrs than heavy carriages. There are two roads to Samoëns, of which that by St. Jeoire should be preferred in going to Sixt, and that by Chatillon in returning from thence to Geneva. A more attractive way for the pedestrian is described in the next route.

1. *By St. Jeoire.*

	Kilomètres	Eng. miles
Nangy	15	9 $\frac{1}{2}$
St. Jeoire	13	8
Tanninges	14	8 $\frac{3}{4}$
Samoëns	14	8 $\frac{3}{4}$
Sixt	8	5
	64	39 $\frac{1}{2}$

The high-road from Geneva to Bonneville is followed to Nangy, where a road turning off to the l. leads by Bonne to Thonon (Rte. K). A little beyond the village the road to St. Jeoire also turns to the l., and gradually mounts over the rising ground separating the Arve from the Valley of the Foron. At Peillonex a fine view is gained over the latter valley, and thence the way lies over an undulating plateau on the N. side of the Môle to La Tour, and about 1 $\frac{1}{2}$ m. farther to

St. Jeoire (Inn: La Couronne), a large village (1,886') on a tributary stream which soon joins the *Riche* torrent. For the mule-track to Thonon, see Rte. K. In the opposite direction a char-road descends along the rt. bank of the Riche, passing its junction with the Giffre, to *Marigny*, and thence to Bonneville, a distance of 11 or 12 m. The road to Sixt crosses the Riche $\frac{1}{2}$ m. from the village, and keeping to the N. of the narrow gorge through which the *Giffre* escapes from its native valley, mounts to *Mieussy*, and then makes a considerable ascent, followed by a still longer descent, before reaching the little town of

Tanninges (Inns: Balances; Lion d'Or), a place of some local importance (2,211'), picturesquely placed in view of the Buet, which remains the most conspicuous object through the valley of the Giffre. Other secondary peaks come into view, and the scenery assumes

gradually a more Alpine character as the traveller approaches

Samoëns (Inns: Croix d'Or, good; Couronne; Ville de Lyon). The first-named, commanding from its windows a fine view, is one of the best country inns in Savoy; and this, together with the charming scenery of the neighbourhood, may induce many to make this a stopping-place when the district becomes better known. Though not so well situated as Sixt for mountain excursions, several interesting walks may be made from Samoëns; the waterfall of the Nant Dant, and the ascent of the *Mont Greyou* (8,497'), 5,958 ft. above the village, are especially recommended. The view from the latter, besides the nearer the mountains, includes Mont Blanc and the Lake of Geneva.

A short distance above Samoëns the Giffre, descending from the valley of Sixt, forces its way through a narrow defile. At the entrance the picturesque chapel of Notre Dame de la Grâce is seen on the l. bank, while the road throughout the valley keeps to the rt. bank. At Tines masses of fallen rocks almost block up the passage, and when these are passed the fine peaks which enclose the valley of Sixt come successively into view. Rather less than 5 m. from Samoëns is

Sixt (Inns: H. du Fer-à-Cheval, landlady well-meaning, but the large house, once a convent, is ill kept, ill attended; noisy, and not clean; Couronne; Etoile), beautifully situated at 2,513 ft. above the sea. Few places in the Alps offer greater attractions to the mountaineer for the variety and beauty of the scenery in its immediate neighbourhood. Those who think of making their head-quarters here will not fail to read the agreeable volume by Mr. Alfred Wills, called 'The Eagle's Nest,' principally devoted to this valley and the passes that give access to it.

The guides here, who are not to be compared to the first-class men of Chamouni, are subject to local regulation, and have a tariff of charges rather

lower than those of their neighbours. Thus the charge for the ascent of the Buet, returning to Sixt, is 10 fr.; to the Fer-à-Cheval, 2 fr. 50 c.; to Chamouni, 15 fr. Moccand, a shoe-maker, and André Rannaud, as also Clement Gallet of Samoëns, have been recommended as guides to the Buet. Letters intended for strangers at Sixt should be addressed to the hotel, as if directed to the Poste Restante they are retained at Samoëns.

A short distance below the village is the junction of the torrents, which flow through the two main branches of the valley. The stream called the Giffre Bas flows due W. from the grand amphitheatre of precipitous peaks that enclose the main branch of the valley, called Vallée de la Combe. The Giffre Haut descends to the N. from the Col d'Anterne, receiving one of its chief affluents through the Vallée des Fonds, which drains the W. slope of the Buet. The valley is especially famed for its waterfalls, and there are several that well deserve a visit which may be combined with some other excursion.

Those who may not intend to cross any of the rather difficult passes communicating with the head of the valley (see Rtes. E and G), should not fail to go so far as the *Fer-à-Cheval*, a spot that has a considerable resemblance to the *cirques*, which are the peculiar characteristic of Pyrenean scenery. A char-road leads thither from the village, a distance of $4\frac{1}{2}$ or 5 m., passing the hamlets of *Nant-Bride*, where a village was destroyed by a bergfall in 1610, and the chapel of *Entre-deux-Monts*, where, by a similar calamity, 157 persons perished in 1602. Near *Nant-Bride* a fine waterfall called *Cascade de Jordane* is seen on the opposite slope of the valley, and that of the *Gouille* (worth a nearer visit) is passed on the rt. bank. The road crosses the main stream and many minor torrents before reaching the *Fer-à-Cheval*. This is a semicircular hollow, surrounded by precipitous walls of rock which are surmounted by a range

of snow-seamed peaks. The highest of these, seen on the l., is the *Pointe de Tenneverges*; the point seen to the rt. is called *Tête Noire*. A series of waterfalls, issuing from the small glaciers that lie in the depressions of the ridge, descend the face of the precipice and add to the singularity of the scene. Above the first range of precipices, on a shelf of the mountain range scarcely noticed from below, are Alpine pastures belonging to the valley of Sixt, but so difficult of access on this side that they have been leased to the Swiss shepherds of the valley of Trient. Beyond the *Fer-à-Cheval* the *Vallée de la Combe* extends for about 4 m. to the NE., enclosed between rugged and precipitous mountains, and leads to the passes described in Rte. G. The hay which is cut on the ledges of these mountains, often reached by a perilous climb, is commonly made up in a bundle and rolled over the precipice to be gathered anew on the lower slope, where it may thus be lodged.

Those who may not wish to undertake the rather laborious ascent of the Buet are advised to make that of the *Vaudru*, NE. of Sixt, 8,714 ft. in height, easily reached in 4 hrs. from the village. After reaching the *châlets* of *Salvador* at the head of a tributary glen of the Giffre, the path zigzags up the mountain towards the N., keeping well to the rt. where the track becomes obscure. A guide is scarcely needed. The view towards *Mont Blanc* is necessarily restricted by the intervening range of the Buet.

The ascent of the Buet is described in Rte. D, and most of the other excursions usually made from Sixt are noticed in the other following Rtes. The *Vallée des Fonds* (Rte. D), the *Cascade de Roget* (Rte. C), and the *Lac de Gers* (Rte. B), all deserve a visit. The latter may be reached in 2 hrs. from Sixt, by a steep and rather difficult way, considerably shorter than the mule-track.

2. *By Bonneville and Châtillon*. This road, though a little longer than that

by St. Jeoire, is that followed by the post-carriage which plies from Geneva to Samoëns on Tuesdays, Thursdays, and Saturdays, returning on the alternate days.

	Kilomètres	Eng. miles
Bonneville	28	17 $\frac{1}{2}$
Tanninges	16	10
Sixt	22	13 $\frac{3}{4}$
	<hr/> 66	<hr/> 41

The road to Bonneville is described in § 16, Rte. A. A gentle ascent along the S. base of the Môle leads from thence by Ayse to *Marigny* on the Giffre, about 2 m. above its junction with the Arve. There is a road hence along the rt. bank which joins that leading from St. Jeoire to Tanninges, close to the former village, but this involves a great detour. The direct way crosses the Giffre, and ascends diagonally the low ridge between Tanninges and the Arve, crowned by the village of *Châtillon*, nearly 8 m. from Bonneville. Near the top another road, leading from Cluses to Tanninges, joins that from Bonneville. The summit of the ridge commands a fine view of the range S. of the Arve, extending the whole length of the valley of the Reposoir, § 12, Rte. D. The descent to Tanninges, little more than 2 m., is rather rapid till the road reaches a bridge over the Giffre, $\frac{1}{2}$ m. from the town. For the sake of the fine view from the ridge, this route should be preferred in going from Sixt to Geneva. For pedestrians a more agreeable way from Châtillon to Sixt lies on the l. bank of the Giffre, passing the pretty village of *Morillon*. A curious semicircular wooden bridge crosses the river about $\frac{1}{4}$ m. from Samoëns, which is thus reached in 3 $\frac{1}{2}$ hrs. from Châtillon.

ROUTE B.

GENEVA TO SIXT, BY CLUSES OR ST. MARTIN.

The lofty range of limestone separating the valley of the Giffre from

that of the Arve, forms at the summit an undulating plateau dotted with small lakes, and surmounted by higher peaks, for the most part bold and rugged in form, while on both sides the ascent to the plateau is rapid and somewhat difficult. The scenery of the tract traversed by the three paths mentioned below is rather singular than beautiful, but to a mountaineer this is perhaps the most desirable route for approaching Sixt.

1. *By Cluses, and the Col d'Arbéron.* Having followed the high-road from Geneva to Sallanches as far as Magland (§ 16, Rte. A), a path is taken to the l. which mounts by the foot of the rocks to a hollow way called *Creux de l'Arche*. Here the track divides. One path, to the l., leads to the villages of Pernan and Arrache. The other, leading to the *Col d'Arbéron*, mounts to the rt. in zig-zags, through pine trees, to the village of *Colonnaz*. Extensive pine woods, now partly felled, extend thence to the col (4,987'), which lies but a short distance from the *Lac de Flaine*, a picturesque lake backed by some of the higher peaks of the range, which is drained by a subterranean outlet. Not far from the lake are the chalets of the same name. The direct way to Sixt lies ENE. to the Lac de Gers, about 2 $\frac{1}{2}$ hrs., and the same direction is followed throughout the very beautiful descent to Sixt, in all about 7 $\frac{1}{2}$ hrs. from Cluses. By a slight detour the *Giéta*, a rounded summit of no great height, but commanding a beautiful view, may be easily reached. It lies l. of the bridle-path leading from the lake to Sixt.

2. *By St. Martin.* The easiest way from St. Martin to Sixt is to follow the high-road towards Cluses till it has passed the *Nant d'Arpenaz* (§ 16, Rte. A). Here a path mounts to the E. to the hamlet of Velu, and reaches a shoulder of the mountain, whence is seen, on the opposite side of the gorge, the village of *Colonnaz*. Avoiding the path which descends thither, a path to the rt. leads nearly direct to the Lac de Flaine, and the

châlets of the same name where this path joins that from Cluses.

A more interesting and steeper way mounts by *Relinges* and *Preilloz* to the châlets of *Vange*, about 1 hr. 10 min. from *St. Martin*. Here a path turns to the rt., ascending through the *Vallon de Haon*, above the torrent which enters the valley of the *Arve* by the *Cascade d'Arpenaz*. An ascent of 40 min. through a pine forest leads to the châlets of *Veran* (vers *Haon* ?), surrounded by an amphitheatre of steep rocks, from which the only exit is by a difficult climb through a sort of chimney, leading to the Alpine pastures of *Monthieu*. These terminate in the *Col de Monthieu*, between the *Croix de Fer* on the l., and the *Coloné* on the rt. These eminences form the outer margin of the *Désert de Platei*, a very extensive plateau of nearly bare rock, traversed by parallel fissures recalling the appearance of glacier crevasses. From the *Col* it is easy to ascend the *Croix de Fer* (7,513'), which may also be reached from the *Châlets de Flaine*. The *eocene* limestone abounds in fossil shells. The *Désert de Platei* extends E. from the *Col de Monthieu* to the *Pointe du Griffon*, and the *Pointe de Salles* (10,433'), and towards the S. to the *Degrés de Platei* and the *Aiguille de Veran* (8,857'). The ascent of the latter is occasionally made for the sake of the remarkable panorama. The *Pointe de Salles* is said to have a signal on the top, but no account of the ascent has come to the knowledge of the editor. Being rather higher than the *Buet*, and at least equally well situated, the expedition well deserves the attention of mountaineers. A lower peak, which may be taken in the day's walk from *St. Martin* to *Sixt*, is the *Pointe de Pelouze* (8,153'). To reach *Sixt* from the *Désert* a guide is necessary. One way is to descend to the *Lac de Flaine*, and from thence follow the route already noticed. Another way, more direct but steeper, descends by the *Châlets de Salles*, standing at the head of a short lateral valley, *Vallon de Salles*—a tributary of the *Giffre Haut*. Several picturesque water-

falls are passed in the descent from the châlets to *Sixt*, a walk of 2½ hrs. (See *Rte. C.*)

3. *By Passy and La Portette*. From the village of *Passy*, about equidistant between *Sallanches*, *St. Gervais*, and *Servoz*, there lies a route to *Sixt* which is very rarely used by strangers, but is described as more striking than that of the *Gemmi*. A path mounts from the village through the wooded glen of *Plane Joux* to the base of a range of seemingly inaccessible precipices, up which it has been carried by the industry of the natives. It is in reality quite safe, but, especially in descending, the appearance of the precipices is somewhat formidable. Nearly 3 hrs. from *Passy* are required to reach the summit of the steep ascent, near to which stand the *Châlets de Platei*. Those who may be induced to make the ascent without intending to reach *Sixt* may, with a guide, return to *Sallanches* by way of the *Lac de Flaine*, taking in the way the summit of the *Croix de Fer*. From the châlets the way to *Sixt* mounts to the NE. in about ¾ hr. by slopes of débris to *La Portette*, a notch in the ridge connecting the *Rochers des Fys* with the *Aiguille de Veran*. The view from the *Col*, commanding the *Désert de Platei* on the one side, and the valley of the *Arve* on the other, is very remarkable. After crossing the limestone plateau, a rather steep descent leads to the *Châlets de Salles*, from whence *Sixt* is easily reached in 2½ hrs. by a path passing near three waterfalls, and in the midst of much beautiful scenery.

ROUTE C.

SIXT TO CHAMOUNI, BY SERVIZ.

If an increasing number of travellers should be induced to take the valley of *Sixt* on their way from *Geneva* or the *Valais* to *Chamouni*, the passes from *Sixt* to *Chamouni* will become more and more frequented. At present the only pass commonly traversed is that of the

Col d'Anterne, practicable for mules, leading to Servoz, on the road from Geneva to Chamouni, 10 m. from the latter place (§ 16, Rte. A). Some mountaineers take a more direct course by the Buet—14 hrs., or the Brévent—nearly 12 hrs. There are, however, several other passes, referred to in this and the following Rtes., which deserve the attention of future travellers. It may be truly said that, although no spot in the High Alps has been so long known and visited as Chamouni, it is but quite recently that effectual efforts have been made to explore the surrounding districts.

1. *By the Col d'Anterne.* About 8 hrs.' steady walking to Servoz. To gain the valley leading to the col the mule-path crosses the Giffre Bas, opposite the village of Sixt, mounts to the village of *Salvagny*, and thence reaches the Giffre Haut at the Pont de Salles, by which it attains the l. bank. A walk of 1 hr. leads to the *Cascade de Roget*, the finest of those in this district famed for its waterfalls. About $1\frac{1}{4}$ hr. farther, another pretty cascade, called *La Pleureuse*, falls close to the opening of the Vallon de Salles, leading to *La Portette* (Rte. B). The mule-path turns sharply to the l., and the ascent continues through the wooded glen of the Giffre Haut along the E. base of the *Pointe de Salles*. As the track rises above the forests the scenery becomes constantly wilder, though still beautiful. The bare summits of the *Rochers des Fys* come gradually into view. From an eminence to the l. of the track there is a fine view of the Buet and of the *Vallée des Fonds*. More than $3\frac{1}{2}$ hrs. are required to reach the *châlets d'Anterne*, inhabited during the summer by women, children, and pigs. In crossing the pass hence to Servoz the track traverses in succession the cretaceous, jurassic, liassic and palæozoic formations, and the geologist will be pleased to find fossils in greater abundance than is usual in the High Alps. About $\frac{3}{4}$ hr. above the *châlets* the track passes along the E. side of the *Lac d'Anterne* (6,808'), and

an equal distance, but rather less ascent, leads to the *Col d'Anterne* (7,612' ?), commanding a noble view of *Mont Blanc*.

[A longer and rougher path, passing through still more beautiful scenery, is recommended by Mr. Wills to pedestrians from Sixt. It lies through the *Vallée des Fonds*, from the head of which the *châlets d'Anterne* are reached by the *Montagne des Grasses Chèvres*.]

The descent to Servoz lies in part over a vast pile of *débris*, the remaining evidence of the fall of one of the crags of the *Rochers des Fys*, and then passes the *châlets* of Ayers and the hamlet of *Le Mont*, reaching Servoz in 3 hrs. from the col. In fine weather the mountaineer will not require a guide.

2. *By the Col du Dérochoir.* 9 hrs.' walking.

This rte. is rather more direct, but much steeper and more difficult, than that of the *Col d'Anterne*. The way lies for about $2\frac{1}{4}$ hrs. by the mule-track leading to that pass. The path leading to the Vallon de Salles keeps to the rt., near *La Pleureuse*, and in about $\frac{1}{2}$ hr. mounts to the *Châlets de Salles*. Here the track to *La Portette* (Rte. B) mounts SW., while that leading to Servoz turns due S., passing immediately below the peak of the *Pointe de Salles*. A long and steep ascent is necessary to reach the *Col du Dérochoir*, a point in the ridge of the *Rochers des Fys*, whence it is possible to descend to Servoz, which is reached in $3\frac{1}{2}$ hrs. by a steep and difficult path. This pass should not be attempted without a guide. Further information is desired.

ROUTE D.

SIXT TO CHAMOUNI — ASCENT OF THE BUET.

Most mountaineers who visit Sixt and Chamouni make the ascent of the Buet a portion of their plan, and it is now often taken in the way between

those places. The ascent, considering its height, is very easy, and a single guide suffices for a party of several travellers moderately used to mountain expeditions; but in passing the glacier near the top it is not advisable to neglect the rope.

To reach Chamouni from Sixt by the summit of the Buet involves a long and hard day's work of 14 hrs., which may, however, be abridged by passing the night at the *Châlets des Fonds*, nearly 2 hrs. above Sixt. In taking the way by the *Col de l'Échaud* there is this advantage, that if the weather should appear unfavourable for the ascent, the traveller may without loss of time continue his route to Chamouni, either by the *Brévent* or by *Servoz*.

In the opinion of competent judges the *Vallée des Fonds*, drained by the *Petit Giffre*, an eastern branch of the *Giffre Haut*, is the most beautiful of all the Alpine glens surrounding Sixt. It is reached by way of *Salvagny*, a little beyond which village a path bears to the l., mounting in great part under the shade of pine forest to the *Châlets des Fonds*, where it is advisable to pass the night before making the ascent of the Buet. The preceding afternoon may be well spent in rambling about the beautiful neighbourhood of the *châlets*, where the *Point de Salles* forms a remarkable feature in the landscape. From hence two ways are taken to the summit. The more direct lies by an Alpine pasture called *Beaux Prés*, and then by steep ledges of limestone rock until it reaches the highest point by a rather steep glacier (*de Lébaud*?). $4\frac{1}{2}$ hrs.' steady climbing from the *châlets* suffice to reach the top by this route. The other more frequented way mounts by a much less difficult path in $3\frac{1}{2}$ hrs. to the *Col de l'Échaud* (8,058'), connecting the *Vallée des Fonds* with that of the *Dioza*, and from thence gains the summit by rapid slopes of slaty rock intermixed with patches of snow, in about $2\frac{1}{2}$ hrs.

The beauty and grandeur of the panorama from the Buet can scarcely

be exaggerated. Now that the chain of the Alps has been more fully explored than was the case a few years back, several other points may be named which must be admitted as rivals, but there are very few that can claim superior attractions. The height of the summit, 10,207 ft., raises it above the nearer ranges, yet leaves in full grandeur the great mass of *Mont Blanc*, rising more than 5,000 ft. above the level of the spectator. To a mountaineer who approaches *Mont Blanc* from the N., the ascent of the Buet from Sixt has the great advantage of giving him at once the most complete general view of the entire range, and if time, weather, and good legs enable him to wind up the day by descending to Chamouni over the *Brévent*, which cuts off from the Buet the lower zone of the great mountain, he will be able to fill up the details of a picture that will remain ineffaceably impressed on his memory.

The easiest way for descending from the Buet, and that by which the ascent is most commonly made from Chamouni, is by the SE. side, partly over snow and in part along ridges of calcareous rock. After descending about 1,800 ft. the traveller reaches a curious rock, naturally broken into ledges which form convenient seats, called *Table au Chantre*. Half an hr. below this, and less than 2 hrs. from the summit (3 hrs. ascending), is the *Pierre à Bérard* (7,498'), a huge detached rock, under which travellers formerly bivouacked. A little *châlet* inn has been opened here for the convenience of those ascending from Chamouni. Complaints have been made of extortionate charges. From hence a mule-path is carried down the side of the mountain till, after passing a grove of larches, it reaches a little grassy plain. Lower down the track lies amidst huge blocks of protogine, and finally gains the valley of the *Eau Noire*, sometimes called *Val de Bérard*, passing the hamlet of *Couteraie*, near to the *Cascade de Poyaz*, and joining the

frequented track from Chamouni to the Tête Noire a short way above Valorsine (§ 16, Rte. H). The point here reached is nearly $4\frac{1}{2}$ hrs. from the summit ($6\frac{1}{2}$ hrs. are required for the ascent), and the traveller may find very fair quarters for the night at the little inn where the path to the Cascade de la Barberine turns off a short distance below Valorsine. In the opposite direction Argentièrre may be reached in $1\frac{1}{4}$ hr., and Chamouni in 3 hrs.' steady walking.

Besides the two ridges already spoken of, leading to the summit of the Buet, a third descends about due S., and connects together the nearly parallel ranges of the Aiguilles Rouges with that extending from the Rochers des Fys to the Dent du Midi. In so doing the same ridge divides the waters which flow through the Dioza SW. to Servoz from those that run NE. through the Val de Bérard to the Trient. There is no difficulty in descending along this ridge to the *Col de Salenton* (8,160') leading from Servoz to Valorsine. This is reached in $1\frac{1}{2}$ hr. from the summit ($2\frac{1}{2}$ hrs. are required for the ascent), and 1 hr. more suffices to reach the *Châlets de Villy*, the highest in the valley of the Dioza (6,076'), where persons ascending from this side find tolerable accommodation for the night. It is, however, necessary to take provisions.

There are two paths from Villy to Servoz, both keeping to the rt. of the Dioza torrent. The more direct way, passable for mules between Servoz and the Col de Salenton, is by the *Châlets de Moëde*. $3\frac{1}{2}$ hrs. suffice for the descent to Servoz, and $4\frac{1}{2}$ hrs. for the ascent. The other path, about $\frac{1}{2}$ hr. longer, passes by the *Lac de Pormenaz*.

In fine weather, the most interesting route from the Buet to Chamouni is to follow a faintly-marked path about due S. from the Châlets de Villy to the ridge of the Brévent, and so combine in a single day's walk the two finest views of the range of Mont Blanc. It is not necessary to gain the highest

point of the Brévent, as the view is nearly as complete from a point in the ridge nearer to Planpraz (see § 16, Rte. A), which is easily reached in 3 hrs. from Villy, or $5\frac{1}{2}$ hrs. from the Buet. In little more than $\frac{1}{2}$ hr. the traveller may descend to the little inn at Planpraz, where, if he be tired or belated, he will find refreshment and very fair quarters for the night, or else may reach Chamouni in 2 hrs.

Travellers who may be deterred by uncertain weather or any other cause from making the ascent of the Buet, after attaining the Col de l'Échaud, may descend to Villy in less than 1 hr., and either gain Servoz by the Châlets de Moëde, or Chamouni by the Brévent, or else reach Valorsine in $3\frac{1}{4}$ hrs. from the Col de Salenton, that pass being about $2\frac{1}{2}$ hrs. from the Col de l'Échaud. 'I descended for a considerable way with a stream on my l., when I crossed it and kept it on my rt. until I arrived at a wooden bridge, after which the path is evident to Valorsine.'—[J. G.]

The torrent of the *Dioza* flows in great part amidst carboniferous rocks, lying between the crystalline mass of the Brévent and the jurassic strata that extend SW. from the Buet to the Col d'Anterne. The trias and lias are represented by two comparatively thin bands, whose outcrop is on the steep NW. declivity of the valley. Near the junction of the carboniferous strata with the trias, fossil remains of plants are abundant. Mr. Wills, guided by Auguste Balmat, found unusually fine specimens on the slopes above the Châlets de Moëde.

ROUTE E.

SIXT TO MARTIGNY, BY SALVENT.

Few portions of the Alps have been so imperfectly explored as the chain between the Buet and the Dent du Midi, and the writer has some difficulty in reconciling the incomplete notices

which have reached him from various sources. The principal summits, all formed of jurassic limestone, form a range parallel to the two principal valleys that enclose it on either side—the Val d'Iliez, and the Val du Trient. Several tributary glens descend nearly due E. from this range. One of these is traversed by the Salanfe, or Salense torrent, and joins the Rhone near Vernayaz; the next descends from the Châlets d'Emaney to join the Trient at Trinquet; while a third, bending S. of E. is traversed by the Barberine torrent, which joins the Eau Noire—the true source of the Trient—below Valorsine (§ 16, Rte. H).

The least difficult way from Sixt to Martigny lies by the slopes of the Tête-Noire, which is the prominent summit at the centre of the amphitheatre of the Fer-à-Cheval. Though appearing very steep, it is said that the ascent is not difficult. Behind the Tête Noire the track traverses the ridge of the *Grenairon*, and then descends to the Châlets des Vieux Émoussons—about $7\frac{1}{2}$ hrs. from Sixt. One hr. lower down are the Châlets des Jeunes Émoussons, and about as much farther the track, passing the Cascade de la Barberine, reaches the inn near the junction of that torrent with the Eau Noire. In default of a recognized name, we shall call this pass *Col de Grenairon*; its height is probably about 8,500 ft. If it be true that $9\frac{1}{2}$ hrs. are required to reach the Barberine inn, the day's walk from Sixt to Martigny would be very long, not less than 13 hrs., exclusive of halts. Chamouni may be reached in about $\frac{1}{2}$ hr. more.

A much more difficult and rarely used way from Sixt to Martigny is by the *Col de Tenneverges*, known to but few of the Sixt guides. According to Joanne, the way lies from the Fer-à-Cheval by the waterfall of Pané (Pas Noir), at the base of the Pic de Tenneverges, and climbs along the very steep S. face of that peak, exposed to the fall of stones which are frequently detached from the face of the mountain.

On the E. side the descent from the Col passes beside the Glacier de Barberine, which is the source of the torrent bearing that name, and joins the first-mentioned route at the Châlets of Émoussons.

The editor has been favoured with an account of this pass, or else of another still nearer to the Pic de Tenneverges, by Major J. Greenwood, who made the passage from Salvent to Sixt in August, 1847.

Turning N. from Salvent, Mr. Greenwood reached in 1 hr. the stream of the Salanfe, and crossing to the l. bank, gained in $2\frac{1}{4}$ hrs. more the châlet at the head of the valley (probably that of Salanfe). Starting at 5.45 on the following morning, he reached in 1 hr. 'the summit of the first col' (Col d'Emaney), and in $1\frac{1}{2}$ hr. farther a stone châlet at the head of the Emaney torrent.

'Soon after leaving the châlet, I came in sight of a huge and steeply inclined glacier, running up towards the foot of a precipice, probably about 2,000 ft. high, towards my left. So wild a scene I never witnessed in any part of the Alps.' The ascent lay by an inclined plain of rock and débris lying on one side of the glacier, by which it is possible to achieve three-fourths of the ascent. This terminates against the face of the precipice, and here it is necessary to climb about 15 yards along the face of the rocks, at a vast height above the glacier, bearing to the rt. till a steep bank of débris is reached, which comes abruptly to an end at the edge of the precipice. The stiff climb from the highest châlet to the summit of the col required 1 hr. and 40 min. The descent on the Sixt side was by a stair-like track, which led in $1\frac{1}{2}$ hr. to some huts, and $1\frac{1}{2}$ hr. more were required to reach the level of the valley of Sixt.

To judge from the most recent maps, it is necessary to cross a pass, called *Col de Barberine*, in order to approach the Col de Tenneverges from the head of the glen of Emaney, and

if so, the above must be a different pass from that laid down on the maps. But it does not appear that the Glaciers of *Mont Ruan*, which lie between the Pic de Tenneverges and the Dent du Midi have been thoroughly explored. The highest point of the Mont Ruan is the rocky peak called *Tour Saillière* (10,587'), the highest summit of the Savoy Alps N. of Mont Blanc. Considerable glaciers descend on each side, and across these a pass might perhaps be made from the Châlets of Barberine to Champéry.

ROUTE F.

SAMOËNS TO CHAMPÉRY AND MONTHEY.

9 hrs.' walking.

Next to Sixt the most attractive place to a mountaineer in this district is Champéry, in the Val d'Illiez. It has the double advantage of being very easy of access, and being provided with a comfortable inn. The route here described affords an easy way for connecting the two together. The passes leading directly from Sixt, described in the next Rte., are more interesting to the mountaineer, but not easy enough for ordinary tourists. The way from Samoëns to Champéry is by an easy mule-path, and requires but 6 hrs.' steady walking. Mules take $6\frac{1}{2}$ hrs. exclusive of halts. It lies through very pleasing forest scenery, near to the NW. limit of the cretaceous and tertiary rocks of the mountain ranges N. of Sixt, which abut unconformably on the liassic and triassic strata forming the head of the valley of the Dranse (Rte. L). A char-road from Samoëns to Thonon, which would replace the first part of this route, has been for some time in contemplation, but little progress appears to have been made. The path from Samoëns mounts a little E. of N. for about $\frac{1}{2}$ hr. to Moulins, and then due N. for 1 hr. more, through very picturesque scenery, to *Allamans*. From hence two tracks

lead across the Col de Golèze. That usually followed reaches the top in $1\frac{1}{4}$ hr., passing by the *Châlets de Golèze*, where wine, bread, and cheese are to be found; the other, a few minutes shorter, passes by the Châlets de la Croix. The *Col de Golèze* (about 5,600') overlooks the head of the valley of the Dranse, which is poured into the Lake of Geneva, near Thonon (Rte. I.), and another rather higher pass, called Col de Coux, leads from the head of the same valley to Champéry. It is therefore desirable to descend as little as possible towards the Dranse, and the path accordingly winds round the head of the valley, beneath some fine limestone crags, amidst magnificent timber. Rather more than $1\frac{1}{4}$ hr. is required to reach the *Col de Cour* (about 6,400'), marked by a cross. The descent is at first rather steep, but after passing, about half-way, a streamlet that issues from a sulphureous spring, it becomes more gentle, and keeping along the l. bank of the torrent it reaches, in 2 hrs. from the Col, the village of

Champéry (Inns : H. de la Dent du Midi, good and reasonable, pension is or was $4\frac{1}{2}$ fr. a day ; Croix Fédérale, second-rate, but not bad), beautifully situated at 3,412 (?) ft. above the sea, close to the base of the Dent du Midi. The ascent of that fine peak is described in Rte. H. There are many other less laborious excursions suited to ordinary tourists. The best guide here is named Obrozenn (probably Oberhauser ?). The *Dent de Bonnavaux* is often ascended for the sake of the view, being much easier of access than the Dent du Midi. The excursion, though rather long, is free from difficulty, and practicable for ladies who are good walkers. The ascent lies in great part by the track leading to the Col de Sage-roix (Rte. G), and is said to require 6 hrs. An excursion recommended to less active travellers is to mount the slopes SW. of the Châlets de Bonnavaux to a cross on a little col, and then to the summit of a knoll to the rt. The return may be made by descending on

the N. side of the same ridge to the châteaux of Barme.

A new char-road along the l. bank of the *Vièze* through the *Val d'Illez*, from Champéry to Monthey, has lately been completed. The distance is about 9 m., and the descent so rapid that in mounting from Monthey no time is gained by taking a carriage. The valley abounds in picturesque scenery, and is now deservedly frequented, though scarcely known a few years ago. The first village, about 1 hr. below Champéry, is called *Val d'Illez*, and nearly 1 hr. farther at the junction of the path from Morgin (Rte. M.) is *Trois Torrents*. In making the new-road, many of the famous erratic blocks lying on the slope above that village (Rte. l.) have been split up. A foot-passenger wishing to go direct to Bex may shorten his road by crossing the *Vièze* opposite *Trois Torrents*, and following a path along the S. side of the valley to *Choux*, and then descending to Massongex opposite Bex (§ 18, Rte. A).

ROUTE G.

SIXT TO CHAMPÉRY.

Two paths lead from Sixt to Champéry, the best-known and most interesting of which is that by the Col de Sageroux. It was formerly considered difficult, and even dangerous; but the way has been improved, and it is now quite within the reach of any one used to mountain excursions. A guide is necessary.

1. *By the Col de Sageroux.* A charming walk of 2 hrs. up the valley of Sixt, and through its upper end, called La Combe, brings the traveller to the foot of a steep path cut in the rocky wall to the l., known as the Pas du Boré. During the ascent the grandest views are obtained of the mountains to the S. of the valley of Sixt, the Pic de Tenneverges on the opposite side of the Combe being the most conspicuous. After a steep climb of 30 to 45 m. the Châlets du Boré are reached, and 30 m.

above them, after traversing a succession of beautiful pastures and another rocky track, a second mountain shelf is gained, marked by a huge fragment of rock called the *Pierre du Dard*. Turning to the rt. the path passes first through pastures interspersed with rocky surfaces, some of the latter showing apparent traces of glacier action, and in less than 30 m. after quitting the *Pierre du Dard*, the châteaux of Vauzalle are reached. These are situated in an exquisite little amphitheatre of green, set in a framework of the most rugged rocks.

'The way to the col now passes over a succession of hillocks and ravines of slaty débris, but the track is very ill-defined, though in clear weather there is no difficulty in maintaining the direction. Looking back, the Buet and Mont Blanc successively appear above the lower intervening ridges, and in 1 hr. the summit is reached. The view in all directions, except the immediate foreground, is striking and beautiful. The valleys of Sixt and Illez are seen far below on either hand, and around them rise the noble summits of Mont Blanc, the Buet, the Pic de Tenneverges, the Dent du Midi, and the mountains on the other side of the Rhone. The rocks on the E. side of the pass present some *mauvais pas*, as the débris is shifting, and the footing consequently insecure, especially after a recent fall of snow. It is necessary to keep at first to the l., and then zigzag down the steep shaly slopes. A bar of iron has been planted to give a firm grasp in one awkward place. From 20 to 30 min. suffice for the descent into a desert and unattractive upland valley, at the lower or E. extremity of which are the *Châlets de Sesanfe*, or *Susanfe* (6,398').

'A magnificent glacier is seen in front, descending from between the Dent du Midi and the Tour Saillière. A few min. farther on, and turning to the l., a spot called the Pas d'Enferne is reached, commanding a most beautiful view of the course of the *Val d'Illez*.

'A steep path now leads down through

a ravine beneath the magnificent precipices of the Dent du Midi, then turns to the l., and, in less than 1 hr. after quitting the Châlets de Sesanfe, reaches the hamlet of Bonnavaux, and, traversing a fine pine forest, in 30 min. more this route rejoins that of the Golette d'Oulaz. A good char-road leads thence to Champéry in $\frac{3}{4}$ hr., crossing the main stream about 10 min. from the village. The entire way from the Châlets de Sesanfe is a succession of scenes of the utmost grandeur combined with the richest and softest beauty; and I know few excursions more to be recommended than the passage of the Col de Sageroux.—[F. F. T.]

Time, not including halts, 8 to 9 hrs.

In ascending from Champéry, a notch in the rocks above the waterfall of Bonnavaux marks the point where the track has been carried. The ascent on that side is in part a rather steep scramble. In one place a wire rope has been fixed to assist the traveller.

2. *By the Golette d'Oulaz.* The track lies by the same way as that just described as far as the Châlets de Vauzalle, nearly 4 hrs. from Sixt. At the châlets a path turns off to the l., passing near to a little lake, and mounts through a wild glen leading to a sort of chimney in the rock, called *Golette d'Oulaz*. Keeping nearly due N., the summit of the pass is reached by steep slopes of snow. The descent also lies over snow-slopes. A short way from the top a track to the l. leads down a lateral valley to Allamans and Samoëns (Rte. F). The descent to Champéry is said to be at least as difficult as that from the Col de Sageroux, and the way is longer by 1 hr. At the *Châlets de Barme* the track reaches one of the principal branches into which the Val d'Illeaz divides above Champéry, about 2 hrs. from that place.

Both in this and the route by the Col de Sageroux it is possible to avoid the steep and rather slippery staircase of the Pas de Boré by a circuitous path used for driving cows up the higher pastures. This way is said to be longer by 1 hr.

ROUTE H.

CHAMPÉRY TO MARTIGNY—ASCENT OF THE DENT DU MIDI.

An active mountaineer may combine the ascent of the Dent du Midi with the way from Champéry to Martigny in a single long day. But however the ascent may be made, it is advisable to make an early start, as the distance is considerable.

The most direct way to the summit of this remarkable peak is by the *Croix de Zelèze*; in all, about $5\frac{1}{2}$ hrs. It is said to require a very steady head, as it is necessary to pass along narrow ledges on the face of precipices. The way more usually taken is longer, but quite free from danger. The traveller mounts in $1\frac{1}{2}$ hr. from Champéry to the hamlet of *Bonnavaux*, where tolerable quarters may be had for the night. A sort of staircase, called l'*Échelle*, leads up steep rocks to an elevated glen, wherein the stream from the Col de Sageroux, to the WSW., meets the stream from the *Col de Sesanfe*, lying ENE., at the Châlets de Sesanfe. The traveller mounts to the last-named Col (7,940'), about due S. of the *Dent du Midi*, and the last part of the ascent lies in great part over steep slopes of débris. By this way at least 5 hrs. are required to reach the highest peak from Bonnavaux. The view is one of the finest in this part of the Alps, having the advantage of immediately overlooking a great part of the valley of the Rhone, and the E. end of the lake of Geneva, along with a panoramic view of the Pennine and Bernese Alps. The height, according to the Federal Survey, is 10,450 ft.

The Col de Sesanfe connects the Dent du Midi with the Tour Saillièrre, a peak apparently still untouched, which might perhaps be reached by following the ridge from the Col. On returning to the col from the Dent du Midi, the traveller may reach Martigny in little more time than is required to

get back to Champéry, but the descent is considerably steeper on this side. The first châteaux reached are those of *Salanfe*. The traveller may either follow the stream of that name down to the high-road between St. Maurice and Martigny (§ 18, Rte. A), close to the Vernayaz station on the railway, or, by bearing to the rt., he may reach in 2 hrs. *Salvent*, in the valley of the Trient (§ 16, Rte. H). To reach St. Maurice, he may follow a path from the Châteaux de Salanfe to the *Col de Zora* (?), leading by the Vallée de St. Barthelemi to the valley of the Rhone near Evionnaz (§ 18).

A traveller bound from Champéry to Chamouni may avail himself of the Col de Sesanfe to reach the inn of the Tête Noire, or that of the Barberine in a long day's walk. Having crossed the col, he will find a path to the rt., a little above the châteaux of Salanfe, leading to the *Col d'Emaney*. This gives access to a steep and wild glen that descends from the Mont Ruan to join the Trient. The writer is informed that a track leads in $2\frac{1}{2}$ hrs. to Finhaut, nearly opposite the Tête Noire; but as a second col must be passed, the distance must be greater. It is said to be a better course for a traveller bound for Chamouni to traverse a third pass—*Col de Barberine*—connecting the head of the Emaney glen with that of the Barberine torrent, and to descend to the inn below Valorsine, passing by the châteaux of Emoussons. This would, however, be a long walk, probably not less than 14 hrs., exclusive of halts.

ROUTE I.

GENEVA TO ST. MAURICE, BY THONON.

	Kilomètres	Eng. miles
Douvaine . . .	18	$11\frac{1}{2}$
Thonon . . .	16	10
Evian . . .	10	$6\frac{1}{2}$
St. Gingolph . .	17	$10\frac{1}{2}$
Bouveret . . .	4	$2\frac{1}{2}$
Vionnaz . . .	10	$6\frac{1}{2}$
Monthey . . .	8	5
St. Maurice . . .	5	3
	<hr/> 88	<hr/> $54\frac{1}{2}$

In the extensive tract of hilly or mountainous country lying between the Giffre and the Lake of Geneva the only frequented road is that which, sweeping in a semicircle round the N. boundary of this district, connects Geneva with St. Maurice in the valley of the Rhone. This formed a portion of the original road of the Simplon, being the shortest way between Geneva and that pass. It has, however, been less frequented than the road by the N. shore of the lake, described in § 18, partly because of the attractions of Lausanne and Vevey on that side of the lake, and in part because travellers dislike the formalities of the custom-house and passport offices encountered in entering Savoy near Geneva, and returning to Swiss territory at St. Gingolph. At present the railway along the N. shore carries most passengers who are pressed for time; but a rival and shorter line is in progress along the Savoy side of the lake. Passengers reaching Bouveret by steamer, or by the road here described, may continue their way to St. Maurice by the railway connecting those stations on the Ligne d'Italie railroad.

After leaving the city, the road lies for about 7 m. through the Canton of Geneva, passing many villages and scattered villas, of which the Villa Diodati, at *Cologny*, is remembered as the residence of Byron. Here the road commands views of the lake and the Jura on one side, and on the other extends along the valley of the Arve to Mont Blanc. A stream named *Hernance* forms the boundary between Switzerland and Savoy, and the road, here separated from the lake by a projecting tract of hilly ground, traverses a low and uninteresting district, in the midst of which lies

Douvaine (Inn : Lion d'Or). The higher Alps are shut out by the range of the Voirons (Rte. K), and a little farther on the hill of Boisy, rising about 1,100 ft. on the rt. of the road, covered with vineyards, commands a fine view, and exhibits an undulation of the moraine, here breaking through the diluvium

which covers all the low country near the lake. About 13 m. from Geneva, at *Massongy*, the road regains a view of the lake and the surrounding heights, which remain in view from hence to Bouveret. About 8 m. farther is

Thonon (Inns: Ville de Genève; Balances), a small ancient town on the lake, the former capital of the province of Chablais. The upper town contains the chief buildings, and a terrace-walk planted with trees and commanding the lake and the mountains. Near at hand, on the alluvial deposits thrust into the lake by the impetuous torrent of the Dranse, are the remains of the castle, afterwards monastery, of *Ripaille*, twice the retreat of Amadeus VIII., forty years sovereign Count and Duke of Savoy; then, after a retirement of five years, elected Pope as Felix V., who died here after renouncing that dignity as well as his dukedom, leaving a rare reputation for wisdom and moderation. The French sold the castle to a farmer in 1793, and little remains to attest its former splendour.

About 2 m. beyond Thonon the road crosses the Dranse by a long bridge of 24 arches, leaving on the rt. the road to St. Jean d'Aulph and Morzine (Rte. L). Passing some magnificent chestnut trees, which have been partly cut down of late years, the road soon reaches *Amphion*, where a good hotel (Casino), chalybeate waters, and gambling, attract Swiss visitors during the summer. Omnibuses ply between this place and

Evian (Inns: H. des Bains, very good; Nord; France; H. des Alpes; Cheval Blanc), a small town just opposite to Lausanne, and on one of the finest sites on the lake. A mineral spring whose water is nearly tasteless enjoys a certain reputation, and a hydropathic establishment also attracts some visitors during the summer months. The climate is cooler than that of Vevey, but more variable, being much exposed to winds from the lake. An enormous chestnut tree at Neuvecelle, $\frac{1}{2}$ m. from the town, is visited by strangers. The ascent of the *Dent d'Oche* (8,010') may

be made from hence in about 6 hrs., but St. Gingolph is a better starting-point.

The high-road beyond Evian passes close to the lake, which on this side presents far bolder scenery than on the opposite shore. After about 6 m. it reaches *Meillerie*, familiar to the readers of the 'Nouvelle Héloïse,' where the rocks plunge directly into the lake, here about 800 ft. in depth. The hamlet of *Bret*, $2\frac{1}{2}$ m. beyond Meillerie, is said to occupy the site of *Tauretumum*, destroyed in the 6th century by the fall of a considerable mass of mountain, which is said to have caused extensive havoc on the shores of the lake by the massive waves which arose beyond their accustomed limits.

St. Gingolph (Inn: La Poste, indifferent), is a village divided into two by the Morges torrent, here marking the frontier between Switzerland and Savoy. This stream rises from a group of mountains, the highest in the immediate neighbourhood of the lake, which go by the collective name Dents d'Oche. The highest summit may be reached in about 5 hrs. The more massive range of the *Grammont*, immediately S. of St. Gingolph, is even better worth a visit, as it more immediately overlooks the lake and the valley of the Rhone as far as St. Maurice. The highest point, sometimes called Signal de Vouyi (7,176'), commands, in addition, a fine Alpine panorama. The most pleasing route for the descent is by the glen and lake of *Taney* to Vouvy. The following note recommends another interesting excursion, connecting St. Gingolph with Vouvy.

'Ascend by the banks of the Morges, through a wood of splendid chestnut and walnut trees, at the back of St. Gingolph, as far as *Novel*. Here take a southerly direction towards a col, passing under the Chat d'Oche, and having crossed it, proceed until you have the Cornettes to the SE.; ascend a pasture valley to the Châlets of Bise, and from thence the summit of the Cornettes is easily gained. The view is magnificent, and is scarcely surpassed by any lake-view

in Switzerland. Descend nearly due E., by the pretty little Lac de Taney, and you will be quite prepared to enjoy a good supper and comfortable bed at the modest inn at Vouvry.'—[R. W. E. F.]

Bouveret (Inn: La Tour), $2\frac{1}{2}$ m. from St. Gingolph, is close to the mouth of the Rhone, and is a place of some traffic, being the station for the lake steamers, and the present terminus of the Ligne d'Italie Railroad. This line is carried SSE. along the l. bank, or Valais side of the Rhone, being joined at St. Maurice by the W. Swiss line, which traverses the opposite or Vaudois side of the valley.

About $1\frac{1}{2}$ m. from the lake is *Porte Valais*, which, fourteen centuries ago, stood on the shore. Skirting the base of the mountain, where a fort and draw-bridge formerly guarded this entrance to the Valais, the road is carried to

Vouvry (Inn: La Poste, fair), near which is the outlet of the Stockalper Canal, excavated in the last century by an individual of that name, to drain the marshes that occupy a large portion of the valley. Besides the Grammont, mentioned above, an excursion may be made from hence to the *Pic de Linleux* (6,181'), also said to command a noble view, and to the lakes of Arcon and Arvin, reputed for their trout. 2 m. farther is *Vionnaz*, and several other small villages are passed before reaching

Monthey (Inn: La Croix d'Or, good and reasonable), at the opening of the Val d'Illeiez (Rte. F), well known to geologists for the erratic blocks to which attention was first called by M. de Charpentier. On the slope above the village a vast assemblage of huge blocks of protogine granite, exactly similar to that found in the Val Ferret on the E. side of Mont Blanc, remain in the site where they were left by the retirement of the great glacier that once traversed the valley of the Rhone. Similar blocks recur at intervals above Vionnaz, and at several other places on the W. slope of the valley, but they are nowhere seen on so great a scale as

here. One block is about 70 ft. long, 36 ft. broad, and 33 ft. high. 2 m. beyond Monthey is *Massongex*, connected by a new bridge with Bex. The valley rapidly contracts between the opposite bases of the Dent du Midi and the Dent de Morcles, as the railway reaches

St. Maurice (Inns: Union; Écu du Valais), described in § 18, Rte. A.

ROUTE K.

BONNEVILLE TO THONON.

The N. part of Savoy, forming the ancient province of Chablais, and lying between the Arve and Giffre and the Lake of Geneva, contains much pleasing scenery, though none that can be called grand. The district might well be visited early in the season, before the higher Alps of Savoy are conveniently accessible. The prevailing direction of the ridges and the minor valleys is parallel to that of the Mont Blanc range—SW. to NE. Three roads are here indicated, but the country is easily accessible in every direction, and a pedestrian may choose his own course without meeting serious obstruction.

1. *By Bonne and Machilly*. Post-road— $26\frac{1}{4}$ m. Following for about $7\frac{1}{2}$ m. the high-road from Bonneville to Geneva (§ 16, Rte. A), the traveller turns to the rt. before reaching Nangy, and in about 2 m. arrives at *Bonne*, a village on the Menoge, lying immediately S. of the *Voirons*, a range of hills formed of tertiary rock, often visited from Geneva for the sake of the view over the lake and the Jura on one side, and the snowy Alps on the other. The finest point of view, though not the highest summit, is said to be a conical eminence above the Châlet de Pralaira, immediately N. of Bonne, 4,613 ft. above the sea. This may be easily reached in about $2\frac{1}{2}$ hrs. from the village. The road sweeps round the W. base of the Voirons, passing near

to, but not crossing, the bounds of the Canton of Geneva, and at *Machilly* joins a carriage-road from that city, about 10 m. distant. From hence, or from *Langin*, the N. end of the *Voirons* is easily accessible. The ruined tower of *Langin*, on the rt. of the road, commands a noble view. Passing through *Bons*, *Brenthonne*, and *Lully*, and within sight of many other villages lying on either side, the road leaves on one hand the ruins of the castle of *La Rochette*, and soon after approaches the more extensive remains of the castle of *Allinges*. To reach the ruins it is shorter to turn to the rt. from the post-road some time before reaching the cross-road which mounts to the village of the same name. Though long abandoned, the chapel is still in tolerable condition, and the roof shows traces of very early fresco painting. The castle stood at about 1,100 ft. above the lake, and, like every eminence in this beautiful district, enjoyed a noble view. About $1\frac{1}{4}$ hr. from the castle is *Thonon* (Rte. I).

2. *By Boège*. Char-road—about 34 miles. Instead of following the road from *Bonne* to *Machilly*, this road issues from the first-named village in the opposite direction, ascends along the rt. bank of the *Menoge* stream, passing first along the S., then by the W. flank of the *Voirons*, and in about 16 m. from *Bonneville*, reaches *Boège* (2,294'), a small town with several country inns. The road now crosses to the rt. bank of the stream, which it follows nearly to its source, passing the villages of *Habère Lullin* and *Habère Poche*. From hence the shortest way for a pedestrian is by a path nearly due N. to the Castle of *Allinges* (see above), which is reached in about 3 hrs. The rough char-road mounts NE. to the *Col des Fourches d'Habère* (4,685'), a slight depression in a range of wooded hills. From the col the road descends to *Lullin*, and about 2 m. farther to *Vailly*, close to the junction of the *Fulaz* with the *Brevon*. Keeping along the slope at some height above the

united streams which are soon merged in the *Dranse*, the way follows the course of the latter stream by the old road, passing *l'Épine* and *Armoy*, noted for its extensive gypsum quarries, which are connected by a tram-way with *Thonon*.

3. *By St. Jeoire and Megevette*. About 30 m. Char-road to *Megevette*. Mule-track thence to *Vailley*. The conical peak of the *Môle* lies between *Bonneville* and *St. Jeoire*, and a pedestrian in fine weather should take that mountain in his way from one place to the other. Vehicles follow the old road to *Sallanches*, and, instead of crossing the *Giffre* by the bridge beyond *Marigny*, follow the rt. bank of that stream to its confluence with the *Riche*, and then mounting along the banks of the *Riche*, reach *St. Jeoire* (Rte. A) in about 8 m. from *Bonneville*. A char-road is carried up the valley of the *Riche* to *Onion*, the principal village, and thence to *Megevette*, about 3,000 ft. above the sea. Nearly due N. of the latter village is the *Col de Jambaz*, reached by a gentle ascent in about 1 hr. From the summit a path to the l. leads to *Lullin*, in the glen of the *Fulaz* (see above), and another to the rt. is the way to the upper part of the valley of *Bellavaux*, whence various paths lead to *Tanninges*, in the valley of the *Giffre*. The mule-track descends from the col directly to *Bellavaux*, also called *Contamines*, the chief village in the *Val de Bellavaux*. This is traversed by the *Brevon*, or *Dranse d'Enfer*, which descends from the *Mont Somman* and the *Roc d'Enfer* to join the main stream of the *Dranse* (Rte. L), about 7 m. above *Thonon*. The *Brevon* receives the minor torrent of the *Fulaz* about 4 m. below *Bellavaux*, and the way to *Thonon* descends along the l. bank till near the junction, when it bears to the left, and joins the char-road from *Lullin* at *Vailly*, nearly 9 m. from *Thonon*.

ROUTE L.

THONON TO SAMOËNS.

	Hrs.' walking	Eng. miles
La Vernaz . . .	3	9
Biot . . .	1 $\frac{3}{4}$	5 $\frac{1}{4}$
Montriond . . .	1 $\frac{3}{4}$	5 $\frac{1}{4}$
Samoëns . . .	4	12
	1 $\frac{1}{2}$	31 $\frac{1}{2}$

The old road by which country carriages ascended the valley of the Dranse lay along the l. bank of the stream, passing *Armoiy*. This involved several ascents and descents, and a new road has been made along the rt. bank, both easier and more picturesque. The Dranse is reached about 1 m. from Thonon, and as the valley enters the hills the slopes become very steep, and the scenery varied and interesting. After about 5 m. the road approaches the point where the main stream receives from the SW. the Brevon, or Dranse d'Enfer, and a little higher up is joined by the Dranse d'Abondance, flowing eastward from the N. side of the Dents d'Oche. The road here crosses to the l. bank, and mounts to the village of *La Vernaz*. This is connected with the smaller village of *Forclaz*, on the rt. bank of the Dranse, by a natural rock-bridge. The road continues along the l. bank of the main stream for about 3 m., and then returns near the hamlet of *Gy* to the rt. bank. Two m. farther is *Biot*, the chief village of the valley (2,684'). Here the stream flows nearly at a level for a considerable distance, and the green basin was formerly chosen for the site of the Abbey of *Aulph*, the ruins of which are passed on the rt. bank, while the village of *St. Jean d'Aulph* (Inn: *Chez Doller*) remains on the opposite side of the Dranse. Another inn (*Le Cheval*) stands near the ruins. Fully 3 m. farther is the village of *Montriond* (3,051'), made up of several scattered hamlets, where the Dranse is formed by the union of three mountain torrents. The E. branch descends from the Col de

Chesery (Rte. M); the S. branch, scarcely 3 m. in length, is traversed by a char-road which, avoiding *Montriond*, mounts to the rather large village of *Les Gets*, formed of several hamlets lying one above the other on the slope of the mountain, and then passes a low col (about 4,300') to gain the valley of the *Foron*, by which *Tanninges* is accessible in about 5 $\frac{1}{4}$ hrs. from *Biot*, or 10 hrs. from *Thonon*. The middle one of the three torrents meeting near *Montriond* descends from the SE. About 2 m. above the junction is *Morzine*, and here the most direct way to *Samoëns*, said to be practicable for chars (?), mounts by a short lateral glen to the *Col de Jouxplane* (6,684'), and winds over the mountain slopes above the glen of the *Valentine*, reaching *Samoëns* in about 4 hrs. from *Montriond*. It is not a much longer rte. to follow the main stream from *Morzine* to its head, where a track to the rt. leads to *Samoëns* by the *Col de Golèze* (Rte. F), and another to the l. reaches *Champéry* by the *Col de Coux*.

ROUTE M.

THONON TO CHAMPÉRY, OR TO MONTHEY.

Several routes may be taken between *Thonon* and the *Val d'Illiez*, all of them passing through agreeable scenery. The chief of them are here briefly noticed.

1. *By the Col d'Abondance*. Fully 13 hrs. to *Champéry*. This was formerly approached by a hilly road that links together several of the villages scattered on the heights E. of the Dranse. Since the completion of the new road on the rt. bank it is much better to follow this to a point below *La Vernaz*, near to the junction of the Dranse d'Abondance with the main torrent. Following the l. bank of the former, a rough road leads in 4 $\frac{1}{4}$ hrs. from *Thonon* to *La Vacheresse* (Inn: *La Croix*), 2,730 ft. in height. From hence the higher

summits of the Dent d'Oche may all be conveniently attacked. The road mounts for nearly 2 hrs. along the rt. bank to *Notre Dame d'Abondance* (Inns: Chez Crétin; La Croix), with the remains of an abbey (3,051'). The ascent is more rapid for another hour at least, when the traveller reaches La Chapelle (Inn: La Croix), the highest village (3,612'). Numerous hamlets occur in the upper part of the valley above La Chapelle, and 2 hrs. are required to reach the *Col d'Abondance* (4,629'), also called Pas de Morgin, here forming the frontier between Savoy and Switzerland. The Baths of *Morgin*, with a tolerable inn, lie but a short distance below the col, and may be reached in $\frac{1}{2}$ hr. or less, fully $9\frac{1}{2}$ hrs. from Thonon. The valley of Morgin, which above the baths descends to NNE., here turns about due E., and leads in $1\frac{1}{2}$ hr., through very fine scenery, to Trois Torrents (Rte. F), about 2 hrs. from Champéry, or 1 hr. above Monthey.

2. *By the Col de Chesery.* $14\frac{1}{2}$ hrs. to Champéry. A circuitous but very picturesque route, following the way from Thonon to Samoëns for $6\frac{1}{2}$ hrs. as far as Montriond (Rte. L). Mounting the E. branch of the valley, in less than 2 m. the traveller comes to the pretty *Lac de Montriond*, about $\frac{1}{2}$ m. long (3,445'). Between bold rocks and cascades and through pine forests the path mounts to the *Col de Chesery*, about 9 hrs. from Thonon. The descent leads through the *Vallée de Morgin*, a wild glen, where some caution is necessary to avoid being caught in marshy places, and in 2 hrs. reaches the baths. (See above.)

3. *By the Col de Champéry.* About 12 hrs. This way is better fitted for a traveller wishing to make the whole distance in one day, being shorter than those above noticed, but it offers no halting-place so good as Morgin. At *Morzine* (Rte. L), rather more than 7 hrs. from Thonon, a glen opens to the E., which leads directly to this col, lying on the S. side of the *Pointe de Mossetta* (7,536'), and immediately W. of Champéry. Further information is desired.

4. *By the Col de Cour.* It is, probably, a shorter course than that last suggested, to follow the middle stream of the Dranse quite to its source above Morzine, and then cross the Col de Coux (Rte. F) to Champéry; $11\frac{1}{2}$ hrs., exclusive of halts, would probably suffice to reach Champéry.

SECTION 18.

ST. BERNARD DISTRICT.

THE division of the Pennine Alps between the Col de Ferrex and the Simplon Pass into subordinate groups is a purely arbitrary process, dictated by convenience, but not resting on orographic or geological grounds. The range of Mont Blanc is on the contrary completely distinct, and terminated to the NE. by the valley of the Dranse. The great group whose culminating point is Monte Rosa, may be considered to have its west termination in the range SE. of the Val Ferrex, whose last summit is the Mont de la Saxe over Courmayeur. In the present section we include the western portion of this group, whose central point is the famous Hospice of the Great St. Bernard. On the N. side of the range this comprises the main valleys of Entremont and Bagnes, with their tributary streams and glaciers, all drained by the Dranse, and on the S. side the basin of the Buttier, with the ranges which separate its eastern and western branches from the Dora Baltea. The eastern limit of this district is formed by the Val Touranche, the Col de Vacornère connecting the head of that valley with the head of the Val Pellina, and the Col de la Reuse de l'Arolla from Prerayen to the head of the Glacier of Chermontane.

Although the Pass of the Great St. Bernard has been known from the earliest times, and has been annually passed by hundreds of tourists, it is only

of late years that the neighbouring valleys, which contain some of the grandest scenery in the Alps, have been explored. As in many other parts of the Pennine Alps, Professor J. D. Forbes was amongst the foremost, and his footsteps were soon followed by several other English travellers. Mr. Gottlieb Studer and Mr. King respectively contributed to direct increased attention to the beauties of the neglected district E. of the St. Bernard, but it is mainly since the formation of the Alpine Club that most of the great glaciers which feed the Dranse and the Buttier have now been thoroughly explored. The papers published in the first and second series of 'Peaks, Passes and Glaciers' bear witness to the energy, intrepidity, and perseverance of the writers whose names are referred to in the following pages. The object of discovering a continuous route along the main range of the Pennine Alps between the two head-quarters of mountaineering activity, Chamouni and Zermatt, has been all but completely accomplished. It is somewhat singular that the only part of the so-called High Level Route that has been left unexplored is the comparatively trifling, and probably easy section between the head of the Val Ferrex and St. Pierre. It does not appear that any one has attempted to find his way direct from the Châlets de Ferrex to the short glen called Les Planards which joins the Dranse about $1\frac{1}{2}$ m. above St. Pierre, or, failing such a pass, to ascertain the easiest path connecting those places. At present those who cross the Mont Blanc range by any of the passes described in § 16, descend to Orsières on their way to reach St. Pierre, and *pro tanto* abandon the High Level Rte. When the desired link shall have been supplied, the way from Chamouni—or rather from the valley of Chamouni—to Zermatt will involve a journey of 5 days, of which the second will be a day of comparative rest. On the first day the traveller starting from the Châlet de l'Ognon, or the Col de Balme, may reach the

châlets of La Foliaz, or those of Ferret, by the Col d'Argentière, or the Col de Saléna (§ 16, Rtes. L and M). On the second, he will cross the pass which remains to be determined to St. Pierre. On the third day he will cross the Col de Sonadon (Rte. F) to the Châlets de Chermontane. On the fourth, he may easily reach Prerayen by the Col de la Reuse de l'Arolla (Rte. K), and on the fifth, the Col de Val Pellina (Rte. G) leads direct to Zermatt. It should, however, be remembered by those who meditate such an expedition, that it can be undertaken with safety, or with satisfaction, only under unusually favourable conditions of steady fine weather, and that none but thoroughly trained mountaineers, in good strength and health, can bear such prolonged exertion without risk of future mischief. It is also a question whether the effort is not rather more than can fairly be imposed upon the guides, who usually are laden with an amount of baggage from which the traveller is free. In any case, with due respect for the authority of one of those who has had a large share in exploring and describing the High Level Route, the writer earnestly advises future travellers not to attempt to reduce it to a four days' journey by combining the pass from the Val Ferret to St. Pierre, either with the day's journey from Chamouni, or with that to Chermontane. The rules of prudence cannot be violated in Alpine travelling with impunity; and to attempt the passage of the Col de Sonadon after having already travelled a distance of 4 or 5 hrs. of rough ground, or after having on the preceding day made an unusually long and laborious day's walk of fully 15 hrs. would be to earn the chance of serious mishap. Although the whole route between the Val Ferret and Zermatt is included in this section, the passes are separately described, under the belief that the continuous route is scarcely to be recommended to average mountaineers.

For details respecting the Grand Combin, the highest summit of this

portion of the Pennine chain, the reader is referred to Rte. E.

ROUTE A.

GENEVA TO AOSTA, BY MARTIGNY AND THE GREAT ST. BERNARD.

	Eng. miles	Hrs. railway
Conpet (by railway)	10	—
Rolle	12	—
Morges	9	—
Lausanne	8	—
Vevey	11	—
Villeneuve	9	—
Bex	11	—
St. Maurice	3	—
Martigny	11	—
	84	5

		Hrs.' walking
St. Branchier	7 $\frac{1}{2}$	2 $\frac{1}{2}$
Orsières	4	1 $\frac{1}{2}$
Liddes	4 $\frac{1}{2}$	1 $\frac{1}{2}$
St. Pierre	3 $\frac{1}{2}$	1 $\frac{1}{2}$
Cantine de Proz	3 $\frac{1}{2}$	1 $\frac{1}{2}$
Hospice	5 $\frac{1}{2}$	2 $\frac{1}{2}$
St. Remy	4	1 $\frac{1}{2}$
Etroubles	4 $\frac{1}{2}$	1 $\frac{1}{2}$
Aosta	10	3 $\frac{1}{2}$
	47	16

The traveller going from Geneva to Martigny has the choice of many different modes of conveyance. He may proceed by railway along the N. shore of the lake to Villeneuve, and thence to St. Maurice, where this line, part of the Chemin de Fer de l'Ouest Suisse, joins the Ligne d'Italie, which goes from Bouveret to Martigny and Sion, or, if indifferent to delay and the French custom-house, he may travel by diligence or hired carriage from Geneva to Bouveret, and from thence take the railway to St. Maurice and Martigny. More agreeable than either of these, to one who does not wish to loiter by the way, is the passage by steamer from Geneva to Villeneuve or Bouveret, from either of which places he may proceed by railway to Martigny. It should be observed that some of the steamers from Geneva touch only at the places on the Swiss shore, while others call also at Thonon, on the Savoy (now French) side of the lake, and Bouveret. The fare from Geneva to Villeneuve or

Bouveret is 6 fr. for 1st class; 3 fr. for 2nd class. Time, about 5 hrs. The railway trains reach Villeneuve in from 2 $\frac{1}{2}$ to 3 hrs. Fares: 1st class, 9 fr. 70 c.; 2nd class, 6 fr. 76 c. Fares from Villeneuve to Martigny: 1st class, 4 fr.; 2nd class, 2 fr. 70 c.

The road along the S. bank from Geneva to St. Maurice is described in § 17, Rte. I. We shall here give a brief description of the lake, with some notice of the principal places on the Swiss shore traversed by the railway to Martigny.

The Lake of Geneva, or Lac Léman (Lacus Lemanus of the Romans), is the largest in Switzerland, and greatly exceeds in dimensions all those which are equally closely connected with the main valleys of the Alps. Its form is that of a crescent with the horns pointing to S., the N. shore being about 56 m., the S. shore about 44 m. in length. The crescent form was more regular at a recent geological period, when the lake extended to Bex, about 11 m. S. of Villeneuve. The detritus of the Rhone has filled up this portion of the bed of the lake, and it appears that within the historical period the waters extended about 1 $\frac{1}{2}$ m. beyond the present E. margin of the lake. The height of the surface varies, according to the season, from 1,228 to 1,234 ft. above the sea level, being usually about 1,230 ft. The level is subject to occasional oscillations, amounting to 2 ft. or even more, which last for a short time, from 15 to 30 min., after which it returns to its previous condition. These curious fluctuations, called *seiches*, appear independent of the direction of the wind, but connected with changes of weather. They are probably caused by the unequal pressure of the atmosphere on different portions of the surface at times when its equilibrium is disturbed. The greatest depth of the lake, in the broad portion between Evian and St. Sulpice, near Lausanne, where it is just 8 m. in width, has been usually stated as 984 ft., but other measures give more than

1,200 ft., making the bottom of the lake about coincide with the level of the sea.

The beauty of the shores of the lake and of the sites of many of the places near its banks has long been celebrated, and can scarcely fail to strike the least susceptible traveller. It is well, however, to mention that it is only from the E. end of the lake, between Vevey and Villeneuve, that the scenery assumes the character of grandeur. The hills on the Savoy side are for the most part rugged and sombre, while those of the Swiss shore fall in gentle vine-covered slopes, thickly set with villages and châteaux. Mont Blanc and the snowy peaks of the Savoy Alps are shut out from the W. end of the lake by the ridge of the Voirons, and from its E. end by the bolder summits of the Dent d'Oche, but are seen from Geneva, and between Nyon and Morges. From Vevey to Bex, where the lake originally extended, the shores are enclosed by comparatively high and bold mountains, and the vista terminates in the grand portal of the defile of St. Maurice, cleft to a depth of nearly 9,000 ft. between the opposite peaks of the Dent du Midi and the Dent de Morcles.

The first place of any note on the Swiss shore is *Coppet* (Inn : Ange), sometimes visited from Geneva for the sake of the château once inhabited by Necker, and afterwards by his daughter, Madame de Staël. Some souvenirs of the latter are shown to strangers. About 6 m. farther is

Nyon (Inns : Couronne ; Soleil), from whence the ascent of the Dôle may be made in 3 or 4 hrs. (see § 16, Rte. A). The next little town is *Rolle* (Inns : Couronne ; Tête Noire), on the shore of the lake, surrounded by vineyards of some local repute, opposite to Thonon and the broad opening of the valley of the Dranse, through which the chain of Mont Blanc comes into view, and is seen for several miles to the E. On a hill about 5 m. N. of Rolle is *Aubonne* (Inns : Couronne ; Lion d'Or), a curious little town, finely situated, and

commanding one of the best views over the lake. The castle was built or altered by Tavernier, the Eastern traveller, in recollection of that of Erivan, on the frontier of Persia. The view is still more extensive from the *Signal de Bougy* (2,730'), near the town.

Morges (Inns : H. des Alpes ; H. du Port ; Couronne), a town with a little port, has a picturesque and tolerably well preserved castle, standing close to the lake, said to have been built by Queen Bertha in the 10th century.

The high-road keeps near the shore, but the railway turns inland to the *Bussigny* station, where the branch of the Ouest Suisse Railway from Yverdon and Neuchâtel joins that to St. Maurice. Travellers proceeding by that line change carriages here. A few miles farther is

Lausanne (Inns : Faucon, good ; H. Gibbon, 'finer position, not so well managed, rather dear' (M.) ; H. Bellevue, well situated, quiet, and reasonable ; H. Richemont, near the railway station, well spoken of ; H. de la Poste, small, but well conducted ; H. du Grand Pont, commercial), the chief town of the Canton Vaud, picturesquely but inconveniently situated on the lower slopes of the Mont Jorat, several hundred feet above the level of the lake, and divided by ravines which make the old streets hilly and inconvenient. A causeway and lofty stone bridge spanning the chief channel have done much to remedy the defect. Many English and other strangers reside in and near to Lausanne for the sake of the climate, superior to that of Geneva, being partly sheltered from the keen NE. wind, the beauty of the site, or comparative cheapness of living.

The upper part of the town, once surrounded by walls, and still called the *Cité*, contains the *Cathedral*, architecturally one of the most remarkable buildings in Switzerland. There are some traces of the original church, founded A.D. 1000, but the greater part of the building dates from 1275. It contains

several interesting monuments, and although somewhat defaced by modern alterations and whitewash, well deserves a visit. The view from the terrace at the W. end of the church alone suffices to reward the trouble of the ascent. The château, formerly the residence of the bishops, is a picturesque pile. The Musée Cantonal may deserve the notice of a naturalist. A collection of pictures—Musée Arlaud—is shown on Sundays and Thursdays, from 11 till 2 o'clock. The public library, containing 46,000 volumes, is rich in works connected with Switzerland, and a circulating library, chez Hignou & Cie, is supplied with English books and newspapers.

'The neighbourhood of Lausanne is famous for the number and beauty of the walks which it presents. Here, and throughout the wine-growing districts bordering the lake, strangers must beware of the alleys and narrow walks between walls or high hedges, which abound in every direction. Appearing to lead up a hill, or to some favourable point of view, they are constantly closed at the end by a gate, with a notice against trespassers. The law is severely enforced against any one entering a vineyard without the owner's permission.'—[M.]

About $1\frac{1}{2}$ m. from the town is the little port, where the steamers call on the way to and from Geneva, at the village of

Ouchy (Inns : H. Beurivage, a fine house, very well kept, one of the best in Switzerland ; H. de l'Ancre, good and cheap ; Pension Bachoffner, well recommended). Families may lodge and board here at from 30 to 40 fr. a week for each person.

About $\frac{1}{2}$ hr. from Lausanne, on the slope of the *Mont Jorat*, is a point called the Signal, accessible in a carriage, which commands a very fine view over the lake. The numerous country houses near the town are more in the English style than is usual on the continent.

The high-road and the railway keep

near to the lake between Lausanne and *Vevey* (Germ. *Vivis*) (Inns : Trois Couronnes, a large handsome house, amongst the best hotels in Switzerland, charges rather high, but not out of proportion to the accommodation; families received *en pension* from 15th Oct. to 1st May on moderate terms ; H. du Lac, much smaller, but clean, comfortable, and cheaper than the last: both are on the lake, and enjoy its beautiful scenery ; Trois Rois, very fair and cheap ; Croix Fédérale ; Faucon). The Château de Vevey in the town, and the Bellevue on the slope above it, are recommended as boarding houses, or *pensions*, which abound along this end of the lake.

Few spots in the neighbourhood of the Alps offer such attractions to strangers as Vevey, and the strip of land along the shore of the lake extending from thence to Villeneuve. It enjoys the mildest winter climate in Switzerland, and is better sheltered from cold winds than the shores of the Italian lakes. It is easily accessible, living is cheap, and the inhabitants are usually courteous to strangers. It is not surprising, therefore, that the hotels and pensions are full throughout the summer, and that many persons remain here even through the winter. The convenience of living in or near a town is counterbalanced by the want of agreeable walks in the immediate neighbourhood of Vevey. These are nearly confined to the carriage-roads, rather hot and dusty, whereas about Montreux and the neighbouring hamlets, where the mountains rise nearer at hand, the pedestrian finds abundant variety of agreeable excursions. Boating on the lake is a constant source of enjoyment. Fares : hire of a boat per hour, without a rower, 1 fr. ; with one man, 2 fr. ; to Chillon or St. Gingolph, with one rower, 6 fr. ; with two men, 10 fr.

There is not much to engage the sight-seer at Vevey, but every rising ground produces in new combinations the glorious views over the lake. The

church of St. Martin, just above the town, is visited for the sake of the view. It contains the tombs of Ludlow, the regicide, and his companions in exile, Broughton, Love, and Cawley. Near the landing-place of the steamers is a large new building, in modern sham-gothic style, called Palais Couvreur, which is opened to the public by its owner on two or three days of the week, and seen at other times with a fee to the servant. Once in every 15 or 16 years a curious festival, dating from a remote antiquity, is held here at the vintage season. Greek myth and sacred history have been laid under contribution to supply the personages represented by the guild of vintners, styled *Abbaie des Vignerons*. On a hill N.E. of Vevey is the Château de Blonay, said to have remained in the family of its present owners for 700 years, commanding a noble view, and farther E. towards Montreux is another castle called Châtelard. The beautiful pass of the Plan de Jaman, between Château d'Oex and Vevey, is described in § 22.

In travelling by railway from Vevey to Villeneuve most of the beautiful scenery is lost, and those who have but little time to visit the neighbourhood should at least prefer the steamer. The narrow space between the mountains and the lake is populous with many hamlets, and a large number of separate country houses and villas. The names of Clarens and Montreux have been constantly celebrated both in prose and verse, but there are several other hamlets not inferior in position. The number of pensions opened here for the reception of strangers is so great, and changes so frequently occur, that a person intending to spend any time here should endeavour to obtain recent local information from some trustworthy quarter. The first point to be decided, according to the season and the taste of each visitor, is between the pensions which stand near the level of the lake and those that have been opened on the slopes of the mountain

or in the little valley which mounts towards the Plan de Jaman. Of those below, the Pension Vaultier, in the village of *Montreux*, the Hôtel des Alpes at *Territet*, by the side of the high-road, and the Pension Penet at *Clarens*, have been well recommended. At least twenty others might be named. The finest site for those who seek mountain air is *Grimon*, about 1 hr. above Montreux. There are several pensions here, of which the largest is called Righi Vaudois. It was formerly well kept, but is said to be much fallen off. The pension of E. Dufour-Delattre at *Bren*, also about 1 hr. above Montreux, is said to be good and finely situated. A passing traveller, wishing to remain a few days, may find very fair accommodation at the Hôtel du Cygne at Vernex, near the shore of the lake.

Rather more than halfway from Montreux to Villeneuve is the celebrated castle of *Chillon*, little altered from the form in which it is represented by some early German master in a picture in the Munich Gallery. The architecture is no way striking; but the extreme beauty of the site, and the many associations linked with the place, make it an object of interest to almost every traveller, and few fail to pay it a visit.

Quite at the end of the lake, but on the E. side of the Rhone, is

Villeneuve (Inns: H. du Port, clean and reasonable; Aigle Noir), lying at the N. extremity of a tract of flat alluvial soil, extending from near Bex to the present border of the lake. The belief that the ancient bed of the lake has to this extent been filled up by the detritus of the Rhone, which needs no external evidence to the mind of the geologist, is confirmed by the identification of *Port Valais*, a place now $1\frac{1}{2}$ m. from the lake, with the Portus Valesiæ of the Romans. Drainage has done much to correct the unhealthy character of the place; but persons sleeping here should abstain from open windows.

On rising ground near the lake, and about $\frac{1}{2}$ m. from Villeneuve, is the Hôtel

Byron, a handsome well-kept house, one of the most agreeable stopping-places in this beautiful neighbourhood. Passing travellers are charged hotel prices; those who remain more than a week, *en pension*, pay $7\frac{1}{2}$ fr. a day in summer, $5\frac{1}{2}$ fr. in winter. Many agreeable walks and drives may be made from hence or from Montreux. Among the longer excursions may be recommended the ascent of the *Rocher de Naye*, or that of the *Dent de Jaman*, the drive to Sepey in the valley of Ormond Dessous, both described in § 22, or on the S. side of the lake the ascent of the Dent d'Oche from St. Gingolph or Bouveret, reached by boat.

Throughout the way from Villeneuve to Bex, the opposite peaks of the Dent de Moreles and the Dent du Midi continue to attract the attention of the mountaineer. The former, rising 9,000 ft. from the level of the valley, is one of the most imposing in the Alps. (See § 17, Rte. H.) At *Aigle* (Inns: H. du Midi; Croix Blanche) the road to Sepey and the Col de Pillon turns off to the l.

Bex (pronounced Bé) (Inns: H. de l'Union, pretty good) is a large village of some importance, from the baths which are frequented by strangers in summer-time, and from the extensive salt mines about 2 m. distant, whose annual produce was largely increased under the management of the late M. Charpentier, the eminent Swiss geologist, to whose writings, at first received with incredulity and ridicule, we mainly owe the recognition of the important part played by glaciers in the past history of the earth. The mode of extracting the salt from the solution in which it is associated with gypsum is similar to that employed at Salins (§ 11, Rte. A). Tickets to visit the mines are procured at an office in the village. About 4 hrs. are required for the visit. Some rare minerals from the salt mines may be purchased at Bex. A family of naturalists, named Thomas, has long resided here, whose members made large collections of dried plants (and

insects?) throughout the Swiss Alps, and in different parts of Italy, which were disposed of on moderate terms. One of the family survives, and keeps collections for sale, which are far better worth the attention of the botanist than those sold at Chamouni, Interlaken, and other places of general resort.

'The neighbourhood of Bex abounds in *pensions* and little mountain inns, where fine scenery, pure air, and tolerable living are obtained at a very cheap rate. That of Madame Bernard above Frenières, the Châlet Amiguet Chésières, and the house of Madame Rosen at Ollen, all deserve to be mentioned'—[M.] Other stopping-places more attractive to the mountaineer are noticed in § 22, where the chief excursions from Bex are incidentally described.

Immediately S. of Bex the Rhone valley is contracted to a mere defile, which extends for several miles between the Dent du Midi and the Dent de Moreles. At the N. end of the defile is a fine bridge, said to rest on Roman foundations, which spans the Rhone by a single arch of 70 ft., marking the spot where the road and the river, here carried through the rock, are forced to quit the rt. bank, and seek a further passage through the little town of

St. Maurice (Inn: L'Union), probably the Roman Agaunum, a very poor-looking place, whose houses are crowded into the narrow space between the mountain and the river. It owes its name to the tradition which fixes this as the site of the martyrdom of St. Maurice and his companions of the Theban Legion in 302. The Augustinian Abbey, said to be the most ancient N. of the Alps, was for centuries one of the most famous in Christendom, having been richly endowed in the 6th century by Sigismund, King of Burgundy. The treasury contains several very curious objects. A gold crozier of most elaborate workmanship, an agate cup of ancient Greek work, a chalice given by Queen Bertha of Burgundy, a copy of the Gospels, and

an *ampoule* of Saracenic handiwork, both given by Charlemagne, are among the articles shown to strangers. At St. Maurice the branch of the Ouest Suisse Railway from Lausanne joins the Ligne d'Italie from Bouveret to Sion, and those who pass from one line to the other must change carriages here.

On the opposite side of the Rhone, in a picturesque position under the Dent de Morcles, are the baths of *Lavey*. The waters are said to owe their medicinal effects to the presence of free nitrogen. On the l. bank, after quitting St. Maurice, the hermitage of Notre-Dame du Sax is seen at a great height on the face of the rock. It is not easy to guess how access to it was originally gained. The chapel of Veriolaz, covered with frescoes, is supposed to mark the exact spot of the massacre of the Theban Legion. On the way to Evionnaz, the high-road traverses the site of the great mud avalanche of 1835. A violent thunderstorm, in which the lightning is said to have struck the peak of the Dent du Midi several times, accompanied by heavy rain, seems to have detached a considerable mass near the summit of the ridge. This descended towards the E., accompanied by a mass of glacier. The rock, composed of a soft shaly limestone, probably saturated with water, seems to have broken up rapidly into a sort of coarse mud, in which huge blocks of harder stone were carried along. After passing through a pine forest, which yielded as if the trees were straw in a stubble-field, the current, moving very slowly, advanced through the cultivated district at the foot of the mountain, carrying houses and trees before it, and finally reached the high-road, which it covered for about a furlong, interrupting the communication for some time.

Evionnaz, a poor village and railway station, stands on the site of the Roman Epaunum, which was destroyed in the 6th century by a similar mud avalanche. Among the causes which have contributed to give the population of the

Valais an appearance of marked inferiority to that of the Canton de Vaud, it is fair to reckon the poverty of the soil and the exposure of the main valley and its chief tributaries to visitations of the elements that in a brief space destroy the fruits of human industry. One of the latest of these was the flood of September, 1852, which laid under water all the low ground between Martigny and St. Maurice, covering the fields with sand and gravel. Between the Evionnaz station and that of Vernayaz is the waterfall of the Salanfe, called *Pisse-vache*. It is a fine fall, especially after rain, and very easy of access, being close to the high-road; but those who attempt a near approach are liable to be wet by the fine spray, which forms a brilliant iris when seen on a fine morning. About 1 m. farther S., at *Vernayaz*, the path leading to Salvent and the Tête Noire turns off to SW. The Trient torrent here issues from a narrow cleft of great depth. A wooden gallery has been built to enable strangers to gain a good view of this remarkable gorge: charge for entrance, 1 fr. A rocky eminence crowned by the ruined castle of La Bâtie, built by Peter of Savoy in 1260, and burnt by George Supersax in 1518, overlooks the town of

Martigny (Inns: Hôtel Clerc, very good; Grande Maison, good and reasonable; H. de la Tour, fallen off; Cygne, very fair, but second rate), near to the right angle formed by the Rhone, flowing WSW. from Brieg, and NNE. from hence to the Lake of Geneva. Standing at the confluence of the Dranse, which descends towards NNE. from the Great St. Bernard, and at the junction of the most frequented route from Chamouni, Martigny is necessarily a place of great resort to Alpine travellers. It possesses however, few attractions of its own; its position is low and hot, and the tract of marshy ground N. of the town, at the junction of the Dranse with the Rhone, cannot contribute to make it

more healthy. An excursion which may be recommended to any one involuntarily detained here is the ascent of a mountain called *Pierre à Voir* (8,124'), in the range between the Val de Bagnes and the Rhone. A horse or mule may be taken as far as the base of the highest ridge; charge from Martigny, 8 fr. The panorama is said to be extremely fine, and it includes portions both of the Bernese and the Pennine Alps, not well seen from any of the more frequented points of view.

There is now a good carriage-road from Martigny to St. Pierre, nearly 20 m., and a rough road, practicable for chars, for 3 or 4 m. farther to the Cantine de Proz. From thence to St. Remy, where chars are found to continue the way to Aosta, the pass must be made on mules or on foot. The lower part of the way lies through a hot valley, and pedestrians will do better to hire a vehicle or else avail themselves of the diligence or omnibus which starts daily from Martigny for Liddes at 9 A.M. A char holding three persons costs 15 fr. to Liddes. Those who visit the hospice, and return to Martigny, may engage a char to the Cantine, use the horse to ride from thence to the hospice, and return on the following day — charge, 30 fr.; charge for a char from St. Remy to Aosta, 10 fr. for one, 14 fr. for two travellers. Guides are not required, except in bad weather, unless it be to carry the traveller's knapsack. The Martigny tariff fixes the following charges: to Orsières, 5 fr.; to Liddes, 6 fr.; to St. Pierre, 9 fr.; to the Hospice, 12 fr.; to St. Remy, in one day, 12 fr., or if reached early on the second day, 15 fr.; if taken for several days, 6 fr. per day, including the number of days necessary to return to Martigny.

About 1 m. from the town, which is called for distinction Martigny la Ville, is *Martigny le Bourg*, where the road crosses the Dranse, and the path to Chamouni by the Forclaz (§ 16, Rte. H) turns off to the rt. The road, following

the bend of the river, soon comes in sight of the *Mont Catogne* (8,461'), lying in the direct way to Orsières and the head of the valley. The road and the river wind round its E. base, while a path mounting from a group of houses called *Valettes*, about $1\frac{1}{4}$ m. beyond the Bourg, passes on the W. side of the mountain, and leads by an easy Col to the Lac de Champey and Orsières (§ 16, Rte. D). This way is to a pedestrian far preferable to the high-road, but it is quite a mistake to suppose that, as stated in a recent guide-book, time is saved by it, the contrary being the case. After passing the poor village of *Boërnier*, the road returns to the rt. bank, and proceeds through a wild defile at the base of the Mont Catogne, where at one point it is carried through a tunnel 215 ft. long. This part of the valley still exhibits traces of the terrible inundation of 1818 (see Rte. D), and immediately beyond the tunnel the traveller may notice the remains of a convent which was destroyed by the flood. The road again crosses to the l. bank to

St. Branchier (Inn: La Croix), a poor village at the meeting of the E. branch of the Dranse, flowing from the Val de Bagnes, with the W. branch descending from the St. Bernard pass through the *Val d'Entremont*. The scenery from hence to Liddes is pleasing, but not of a striking character. The ruins of several castles are seen near St. Branchier, and it is told by some annalist that one of them was considerable enough to lodge the Emperor Sigismund with a suite of 800 knights. The road again crosses the Dranse, and returns to the l. bank before reaching

Orsières (Inns: H. des Alpes, clean and comfortable; Couronne; Lion), the chief village of the valley (2,894'), close to the junction of the Dranse de Ferret with the Dranse d'Entremont, and at the meeting of the routes to Courmayeur, by the Col de Ferret, and those to Chamouni, by the Lac de Champey and Trient or by the Glacier

du Tour. Throughout the lower part of the Val d'Entremont the botanist will be interested by observing the presence of many plants usually characteristic of a warm climate, along with sub-Alpine species that have descended from the neighbouring mountains. Thus he may find *Vesicaria utriculata*, *Ononis natrix*, and *O. rotundifolia*, *Astragalus onobrychis*, *Vicia onobrychoidea*, *Caucalis grandiflora*, *Onosma montanum*, *Antirrhinum Bauhini*, *Euphrasia lutea*, *Campanula bononiensis*, *Stipa capillata*, *Bromus squarrosus*, and *B. tectorum*, along with *Sempervivum arachnoideum*, *Scutellaria alpina*, *Juniperus sabina*, *Goodyera repens*, *Poa alpina*, &c.

From Orsières the road begins to ascend more rapidly, winding up the E. slope of the valley, where the pedestrian may make several short cuts to

Liddes (Inns: H. d'Angleterre, tolerable; L'Union, indifferent, dear; and several small unattractive houses frequented by guides and char-drivers), 4,390 ft. above the sea; but the valley is warm, and cultivation does not seem to suffer. The omnibus from hence to Martigny starts, or did start, at 2 P.M. Return chams may generally be had for about 8fr., but more is demanded. A mule from hence to the hospice costs 6 fr. The ascent continues rather steep to

St. Pierre, also called Bourg St. Pierre (Inn: Au Déjeuner de Napoléon, tolerable), a miserable-looking village (5,358'), where the road formerly ceased, and where, in the famous passage of Napoleon's army in May, 1800, the formidable difficulties of the route were first experienced. The little village contains various records of the early importance of the pass. A Roman column of the reign of the younger Constantine, still standing near the church, was perhaps merely a milestone. An inscription by Bishop Hugo of Geneva, who built the present church in 1010, records the repulse of the Saracens, who had crossed the pass fifty years before.

The brothers Ballay, of St. Pierre, are recommended as bold mountaineers and good guides for the ascent of the Combin and the glacier passes of this neighbourhood (see Rtes. E and F).

Above St. Pierre the road crosses a deep gorge, through which the torrent from the Valsorey glacier descends to join the Dranse. A little higher up on the l. it forms a fine waterfall. The old tortuous and uneven track lay through a pine forest; but the new road, partly cut in the rock, mounts by a gradual ascent, at a great height above the Dranse, to the *Cantine de Proz* (5,912'), where tolerable night-quarters may be found by those who would make the ascent of the Vêlan. The former landlord, André Dorsaz, a well-known guide, died of fever in 1857; his son is said to be also a good guide (see Rte. C). The Cantine stands in a little stony plain, above which, on the l. hand, is seen a part of the Glacier de Proz. When this plain is traversed, the mule-track winds up the rugged but not very steep face of the mountain, keeping about due S. The scenery is rather wild than grand, as the path is for the most part shut in among rocks, often interspersed with patches of snow. A cross by the wayside marks the spot where one of the brethren and three servants were lost in an avalanche, in Nov., 1845. The most considerable snow-patch, lying in a hollow where it scarcely ever melts, is passed, and a few minutes farther the traveller finds himself on the crest of the pass, and close to the *Hospice of the Great St. Bernard*. The pass lies in a depression between the *Mont Chenalettaz* and the *Mont Mort* (9,403'), directed from NE. to SW. The massive stone building is therefore exposed to the full force of the wind from those opposite quarters, while partially sheltered in other directions. It consists of stabling and store-houses on the ground floor; the first floor is occupied by various offices and by the chapel; on the second floor are the refectory, drawing-room, and the rooms in which 70 or 80 strangers

can be lodged. An adjoining house, called Hôtel St. Louis, is chiefly intended as a refuge in case of need, the hospice having twice been partially destroyed by fire. Near at hand is the Morgue, a low building, the ghastly contents of which may be inspected through a grated window. Here the bodies of travellers who have perished on the pass are kept until claimed by their relatives. Formerly the number was considerable; but of late years all those who have died have been claimed, so that no addition has been made to the repository. At this height the dryness of the air and the severe cold cause the bodies to shrivel without decomposition.

To attempt a sketch of the history of the pass and of the hospice, from the period of the Celtic Veragri, who built here a temple or sanctuary, to that of the passage by Napoleon's army in 1800, does not enter into the plan of this work. The site of the Roman temple to Jupiter Penninus is still marked by stone steps cut into the rock, but no part of the building remains. The foundation of the present hospice, under the care of ecclesiastics resident throughout the year, by St. Bernard of Menthon, in 962, was preceded by some earlier refuge for travellers annexed to a chapel or hermitage, which existed as early as 851. In King's 'Italian Valleys of the Pennine Alps,' and Brockedon's 'Passes of the Alps,' the reader may find much interesting information.

The community consists of 40 Augustinian canons, of whom 10 or 12 reside here, others are placed at the hospice on the Simplon, and those whose health no longer permits them to face the severe Alpine winters, a result which commonly happens after 12 or 15 years' residence at the hospice, remain in a branch house at Martigny. The number of travellers annually crossing the pass varies from 16,000 to 20,000, and a large proportion of the poorer class go by in winter or early spring, when, without the shelter and assistance

obtained at the hospice, the pass would be practically impossible. The large majority are sheltered and fed gratuitously, and no demand is made from any traveller; but it is understood that those who can afford it should give *at least as much* as they would in a regular hotel. The property of the community has been very much reduced during the present century, and their means of relieving poor travellers proportionately restricted.

Visitors are received by the Clavandier, or Bursar, who presides at the table, which is laid in a separate room for ladies and for gentlemen travelling in their company. Others dine and sup with the monks in the refectory. The food is plain, but quite sufficient, and the beds are clean, and as comfortable as can be expected in so exposed a situation. Travellers all acknowledge the courtesy and attention with which they are received. The albums, containing the names of many distinguished persons, a small assortment of books, and some collections of natural history, including the plants and minerals of the neighbourhood, will help to pass some hours, in case travellers should be detained by bad weather.

Irrespective of its primary mission of charity, the community has incidentally performed some services to science, especially by the maintenance of a regular series of meteorological observations, continued for many years, and published in the *Bibliothèque Universelle* of Geneva. Besides their importance as throwing light upon the physics of the Alps, these are of peculiar value to all persons engaged in hypsometrical enquiries in the central region of the Alps. There is reason to believe that the main source of error in the determination of heights by the barometer, arising from the disturbing influence of the soil upon the indications of the thermometer is far less sensible when comparisons are made with this station rather than with places at a low level, such as Geneva, Aosta, Turin, &c., and on this account M. Plantamour

contents that the best approximation to the height of Alpine peaks in this region is obtained by attributing to the measurement ascertained by comparison with the St. Bernard four times the value of those derived from comparison with Geneva or Aosta. The exact height of the cistern of the barometer at the hospice, found by M. Plantamour after careful levelling from Geneva, is 8,131 ft. This may be taken to agree within a few ft. with the height of the pass. The mean temperature of the year at the hospice is somewhat below freezing point. That of the three winter months is 15° Fahr., that of summer, 48°. The greatest cold recorded is -29°, and the greatest heat 68°. The snow usually lies for 9 months unmelted, but there have been seasons when not a week has passed without fresh snow.

Travellers intent upon Alpine expeditions should be aware that it is not possible to obtain breakfast until after mass, which is not over until about 6 A.M.

It has at various times been proposed to continue the carriage-road from St. Pierre to Aosta by the hospice. The chief objection to this project arises from the steepness of the descent from the summit to St. Remy, and a rival plan was adopted a few years ago which would make the road pass by the *Col de Menouve*, between the present pass and the Mont Vélán. This is about 1,200 ft. higher than the St. Bernard, but it was proposed to avoid the upper part by a tunnel 1½ m. in length, to be opened at 7,145 ft. above the sea. The works were commenced some years ago, but were suspended owing to financial difficulties (see Rte. C).

Before leaving the Hospice travellers will enquire for the celebrated dogs, of which two or three are often to be seen about the entrance. They are very powerful animals; but it is said that since the loss of several in 1825, the purity of the race has not been maintained. The chief use of the dogs is to find the way in the midst of the deep snow, when, during the winter,

two or three lay-brethren descend daily a certain distance on either side of the pass, to guide and assist poor travellers who are forced to make the passage in that season.

For those who spend a fine afternoon or morning at the Hospice, the ascent of the Chenalettaz or the Mont Mort is to be recommended. Either may be reached in less than an hour. The view of the Mont Blanc range, in which the peak of the Grandes Jorasses is here the most conspicuous, well rewards the slight trouble of the ascent. The view from the Pointe de Dronaz is more extensive, but the ascent requires much more time.

On the side of Italy the Hospice overlooks a small lake, beyond which is seen a part of the range between the Val de Bosses (Rte. B) and the Val Ferret, in which a conical summit, called *Pain de Sucre*, is prominent. At the side of the lake, a column marks the boundary between Switzerland and Italy, and the path, which soon begins to descend rapidly, winding round the mountain to the l., gradually opens out a view to the S., where trees and cultivation again meet the eyes of the traveller. In a green basin of Alpine pasturage is the Vacherie, where the monks keep their cows in summer. The botanist, who will find near the Hospice many of the characteristic species of the High Alps, and some rareties, e. g. *Carex microstyla*, may gather several uncommon plants in the descent towards St. Remy, and especially *Pedicularis atrorubens*, and several scarce lichens. The descent from the Vacherie is rather steep to

St. Remy, a poor village with a tolerable little inn, the Italian custom-house station. Those who carry more than a small number of cigars will do well to declare them, as the regulations are strict. [For the path to Courmayeur see Rte. B.] Most travellers hire a char here for the descent to Aosta, throughout which the rapid change in the vegetation is very striking. This is particularly the case

when, after passing *St. Oyen* and *Etroubles*, the road reaches *Gignod*, near the junction of the main stream of the *Buttier*, proceeding from *Val Pellina* with the lesser stream from the *Val de Bosses*; the fine chestnut trees and the richness of the trellised vines, contrasted with the snowy summits of the *Val Pellina* or the *Val de Cogne*, form pictures of extreme beauty. A little farther on, at the base of the fine peak of the *Becca di Nona*, the traveller gains his first view of

Aosta (see § 15, *Rte. A*).

ROUTE B.

HOSPICE OF THE GREAT ST. BERNARD TO COURMAYEUR.

In descending from the great *St. Bernard* towards *Aosta*, the traveller has on his rt. hand a range running from NE. to SW., whose highest summit is the *Grande Rossère* (10,904'), separating him from the Piedmontese *Val Ferrex*, and facing him another lower range running nearly due E. and W., which forms the N. boundary of the *Val d'Aosta*. The valley lying between these ranges is the *Val de Bosses*. It is traversed by a branch of the *Buttier*, which flowing E. joins near *Gignod* the main branch of that stream, descending to SW. from the *Val Pellina*; and the united streams, after draining the S. side of the Pennine range from the *Mont Collon* nearly to *Courmayeur*, are united to the *Dora Baltea* under the walls of *Aosta*. Three ways present themselves to the traveller who would go from the *St. Bernard* to *Courmayeur* without making the considerable detour by *Aosta*. The first, avoiding any considerable descent, keeps along the ridge W. of the *Hospice*, and joins the *Val Ferrex* above the *Châlets de Ferrex* on the Swiss side of the *Col*. The second descends to the *Vacherie* or to *St. Remy*, and thence gains the *Col de la Seréna* at the W. end of the

Val de Bosses. The third route crosses the *Val de Bosses* opposite to *St. Remy*, and mounts to the *Col de Vertosan*, which gives access to the *Val d'Aosta* between *Ivrogne* and *La Salle*.

1. *By the Col de la Fenêtre*. 8½ hrs. or 9½ hrs. when taken from *Courmayeur*.

The way is pretty well traced, as it is daily traversed in summer by the mules employed to carry wood from the *Val Ferrex* to the *Hospice*. In cloudy weather, especially if there be any risk of a snow-storm, a guide is indispensable. The summit of *Col de la Fenêtre* is about 1½ hr. from the *Hospice*. From thence the track lies over high broken ground, passing near some small tarns, then descends, and finally joins that from *Orsières* to the *Col de Ferrex* (§ 16, *Rte. K*), a short way above the *Châlets de Ferrex*. About 4½ hrs. will suffice from the *Hospice* to reach the *Col de Ferrex*, from whence the descent to *Courmayeur* is made in 4 hrs. The advantage of this route is in the fine view of the range of *Mont Blanc* from the *Col de Ferrex*. It may serve to vary the way back to *Martigny* for one who has mounted from thence to the *Hospice*, and desires to return into Switzerland. He may descend direct from the *Châlets de Banderai* to *Orsières* in about 4 hrs., or, by a detour of 1½ hr., he may mount to the *Col de Ferrex*, enjoy the view, and then descend to *Orsières*.

This pass is not to be confounded with the *Col de Fenêtre* at the head of the *Val de Bagnes* (*Rte. D*), nor with the *Col de la Fenêtre* above *Susa* (§ 5, *Rte. B*).

The editor has no information respecting the *Col de St. Remy*, said to connect the head of the *Val de Bosses* with the Piedmontese *Val Ferrex*. It is also said to be longer than the *Col de la Seréna*, but it ought to command a fine view of the least known portion of the *Mont Blanc* range—that between the *Grandes Jorasses* and the *Mont Dolent*.

The head of the Val de Bosses is apparently the best side for undertaking the ascent of the *Grande Rossère* (10,904'). Though quite neglected by tourists, this must be one of the finest points for a view of the Mont Blanc range. It is said to be easy of access on the S. side, and was used as a trigonometrical station by the Piedmontese engineers. The *Mont Carmel* (9,057'), also called Mont Cormet, lies between the Grande Rossère and Courmayeur or Morgex. In height and position it is the counterpart of the Cramont, but is rarely, if ever, visited.

2. *By the Col de la Seréna.* From 7 to 9 hrs.

This is not a very interesting walk, but it offers the easiest way for those bound from the Hospice to Courmayeur, the track noticed below from the Vacherie being the shortest way between those places.

The shortest course for a pedestrian is to follow a path which turns to the rt. close to the Vacherie of the Hospice, and, winding round the slopes of the mountains, reaches the chalet at the foot of the *Col de la Seréna*, where it joins the regular track. This is a considerable short-cut, but is fatiguing, and requires a local guide. A good walker may easily get to Courmayeur this way in 7 hrs. The ordinary route, which is passable for mules, descends as far as St. Remy on the way towards Aosta. 'You there take the road to the rt. to the village of *Bosses*, then through fields for $\frac{1}{2}$ hr., and you arrive at the foot of the Col. Half an hr.'s ascent through a pine-forest brings you to the last chalet, where milk and cheese may be obtained as long as the cows are on the mountain. Here, instead of following a road to the rt., go up the mountain by a zigzag path immediately behind the chalet, and $1\frac{1}{2}$ hr.'s good walking will land you on the top of the Col. This part of the road is exceedingly steep, but the view from the summit well rewards your labour. The scenery is very wild, especially towards the N. and NW., offering a great con-

trast to the beautifully cultivated valley of Aosta, which shortly afterwards (just above the village of *Morges*) you see extended at your feet. From Morges to Morgex, on the high-road between Aosta and Courmayeur, is a walk down a stony path of about $\frac{1}{2}$ hr. Thence to Courmayeur 2 hrs. walk; in all about 9 hrs'. from the Hospice.' The *Seréna* abounds with ptarmigan and chamois. The height of the Col is about 7,400 ft.

3. *By the Col de Vertosan.* This pass leads from the Val de Bosses into the Val d'Aosta, close to the bridge where the high-road crosses to the rt. bank of the Dora, between La Salle and Ivrogne. It is very little used, as it offers a circuitous route for those going from the Val de Bosses to Courmayeur. It would, however, be the shortest way for a traveller bound for the Val Grisanche, or for the pass leading from Derby to Ste. Marguérite. See § 15, Rtes. B & C. The Col de Vertosan is said to be about 200 ft. lower than that of *Seréna*. [Further information is desired.]

ROUTE C.

ST. PIERRE TO AOSTA, BY THE COL DE MENOUE—ASCENT OF THE MONT VÉLAN.

As mentioned in Rte. A, the Swiss authorities adopted some years ago a plan for carrying a carriage-road from Martigny to Aosta by the Col de Menoue, through a tunnel considerably below the summit of that pass, which lies about half way between the hospice of the Great St. Bernard and the Mont Vélan. The latter mountain, though not often ascended, is extremely well worth the attention of mountaineers, as it commands one of the finest views in the Alps, and is attainable without risk or much fatigue. It is accessible from the Valsorey, which joins the Val d'Entremont close to St. Pierre, or by a more direct and rather steeper course from the Cantine

de Proz, at the termination of the carriage-road leading towards the St. Bernard. Starting from the latter place, or even from St. Pierre, an active mountaineer may easily make the ascent, and then cross the Col de Menouve, so as to reach Aosta on the same evening. Either of the brothers Ballay, of St. Pierre, or Dorsaz, the son of the late André Dorsaz of the Cantine de Proz, or Pierre Victor Morey of St. Pierre, may be recommended as guides. For a party not consisting of practised ice-men, it would be advisable to take one guide for each traveller. Dorsaz expects 20 fr. for the ascent, returning to the Val d'Entremont. If taken to Aosta he would naturally demand more.

Ascending the grassy slopes on the l. of the track to St. Bernard, about $\frac{1}{4}$ hr. from the Cantine, the way to the Vélán lies up a stony waste, above the rt. bank of the torrent, to the foot of the *Glacier de Proz*, also called *Glacier de Menouve*, which flows from the NW. base of the mountain. The *Mont Vélán*, as seen on the N. and W. side, is a snowy dome, nearly flat at the top, but steep on the side where it is ribbed by projecting edges of sharp rock, that stand out from the surface of the névé. The *Glacier de Proz* is reached in $2\frac{1}{2}$ hrs. from the Cantine, and nearly an hour more is occupied in ascending to its upper end. It is little crevassed, and presents no difficulty save a wide chasm or bergschrund, marking the line along which the glacier annually detaches itself from the névé of the mountain. Over this a snow-bridge is usually to be found, and the remainder of the ascent is made along some of the rocky ridges which reach near to the summit of the dome. The axe is here called into play, and the way is in parts so steep that the guides usually prefer to descend by the Valsorey glacier. The summit of the Vélán (12,353'), reached in 6 hrs. from the Cantine, including a halt for breakfast, is thought by some excellent judges to command the finest view in the Pen-

nine Alps. If rather less central as regards the main chain than the Becca di Nona, or Mont Emilius, this is counterbalanced by the view of the Bernese Alps, and of part of the Lake of Geneva, which unexpectedly enters into the panorama. If the traveller should not intend to cross the Col de Menouve, he will do well to descend from the Vélán by the *Glacier de Valsorey*, lying on its NE. slope in the direction of the Grand Combin, an extremely grand object when seen from this side. The upper part of the Valsorey Glacier is steep, and much crevassed, and it is necessary to keep to the arête, overlooking the valley of Ollomont. After a considerable descent, the traveller gains the lower level of the glacier, which bends gradually rather W. of N., receives on the rt. the ice-stream of the *Glacier de Sonadon* (Rte. F), and at the base of a lofty buttress joins the *Glacier de Tzeudet*, issuing from a hollow in the mountain to the S. In the angle between the latter ice-stream and that of Valsorey is a curious glacier lake, called *Goille à Vassu*, described by Saussure (*Voyages*, ch. xlv.). It is said to be full of water in spring, and usually dry in summer. The descent to St. Pierre lies through the Valsorey, at first along the E. moraine, and then by a sheep-track along the rt. bank, with the Dent du Midi in the distant back-ground. Nearly 5 hrs. are required to reach St. Pierre from the summit, unless the glacier be in very favourable condition.

The *Col de Menouve* is 9,059 ft. in height, but the tunnel, $1\frac{1}{2}$ m. in length, through which it was originally proposed to carry the road, was to have lain 1,414 ft. below the crest of the pass. It was subsequently considered that owing to the exposure to avalanches, and the difficulty of the ground, even that height would be found excessive; and a second plan was proposed which would have placed the tunnel several hundred ft. lower, or at 6,827 ft. above the sealevel; but this alteration in the plan involved the lengthening of the tunnel to 2 miles and

506 yards. The Italian Government is naturally indisposed to undertake so great a work while the Modane tunnel, and so many other great undertakings, are in hand; and it is not likely that the Swiss unaided should achieve the project.

ROUTE D.

MARTIGNY TO AOSTA, BY THE VAL DE BAGNES AND THE COL DE FENÊTRE.

	Hrs.' walking	Eng. miles
St. Branchier . . .	2 $\frac{1}{2}$	7 $\frac{1}{2}$
Chables . . .	1 $\frac{1}{2}$	4 $\frac{1}{2}$
Lourtier . . .	1 $\frac{1}{2}$	3 $\frac{1}{2}$
Torembec . . .	3	9
Chermontane . . .	2 $\frac{1}{2}$	7
Col de Fenêtre . . .	1 $\frac{1}{4}$	3
Valpellina . . .	4	10
Aosta . . .	2 $\frac{1}{2}$	8
	<hr/> 18 $\frac{1}{4}$	<hr/> 52 $\frac{3}{4}$

The two main branches of the Dranse flow through two nearly parallel valleys, the Val d'Entremont and the Val de Bagnes, and unite their waters near St. Branchier. Each is connected with the Val d'Aosta by a pass which, at least in summer, is quite free from difficulty. But the destiny of the two valleys has been widely different. The first has from the earliest times been one of the main channels of communication between Switzerland and Italy, and is traversed annually by thousands of travellers; while the second has continued even to the present time to be one of the most neglected portions of the Alps, and were it not for the destructive inundation which early in this century issued from the narrow mouth of the valley to carry destruction even below Martigny, the name of the Val de Bagnes would scarcely have been known to the outer world until the publications of Professor Forbes and of the Alpine Club made it tolerably familiar to British readers.

The main difficulty for mountaineers who may wish to explore the numerous peaks and glaciers which surround the Val de Bagnes is the absence of ac-

commodation. At Chables there is a tolerable inn, but this is the only one in the entire valley. Elsewhere there is nothing but châtlet fare—black bread, milk, and cheese, and hay, seldom dry, to sleep upon. It has been said that some enterprising native was about to open a little inn near the Pont de Mauvoisin below the foot of the Gétroz glacier; but the editor has not learned that the project has been accomplished. The point where such an inn is most to be desired is at the Châlets de Chermontane, at the upper end of the valley. Placed at the meeting of many glacier routes, and in the immediate neighbourhood of such fine points of view as the Mont Gelé and the Mont Avril, an Alpine inn might rival the attractions of Heiligenblut or the Aeggischhorn. The very rare *Crepis jubata* was first discovered at the upper end of the Val de Bagnes.

The people of the valley appear to be superior to their neighbours in the Val d'Entremont, goître and cretinism being almost unknown. Strangers are kindly received, and chamois-hunting being a common pursuit, tolerably good guides for difficult excursions are easily found. They usually can speak intelligible French; but the dialect of this and the valleys farther east, called by the German Swiss *kauderwelsch*, is an unknown tongue to most strangers.

From St. Branchier (Rte. A) a char-road has been carried nearly 7 miles up the valley. It crosses the Dranse just below the junction of the two streams, and then proceeds along the rt. bank of the Dranse de Bagnes to

Chables (Inn: Chez Perrodin, tolerably good and reasonable), the chief village of the valley, picturesquely situated, and in the neighbourhood of some interesting scenery. The *Pierre à Voir* (8,124') is much nearer to this place than to Martigny, but the ascent would probably be much steeper. The *Becca de Jazie* (B. d'Évasie of Studer's map) S. of Chables, and immediately above Liddes, is said to be also a fine point of view.

[A path leads from Chables to Ridde, in the valley of the Rhone, by the *Col d'Etablou*, also called *Col de Verbier*. It lies E. of the *Pierre à Voir*, and is apparently about 7,000 ft. in height. The way lies by the village of *Verbier*, whence a stream leads up to near the *Col*. On the N. side the descent lies at first over grassy slopes, then through a zone of rhododendron and pine woods. After passing over a tract of sloping pastures a steeper declivity leads down to the village of *Riddes*. Large surfaces of rock at a great height above the valley are seen to be polished and striated by the gigantic glacier which once extended from the *Furca* at least as far as the *Lake of Geneva*.]

At Chables the road up the *Val de Bagnes* crosses the *Dranse* and comes to an end about 3 m. farther on, at *Cnampsec*. Beyond that place a mule-path, returning to the rt. bank, leads to *Lourtier* (3,657'), the last of the numerous villages which are crowded together in the lower part of the valley. Though there is no inn, the people are hospitable, and a stranger may easily find quarters for the night; but if averse to closeness and bad smells, he will do better to resort to the hay-couch in some chalet higher up the valley, or push on to Chables if travelling in the opposite direction. *Lourtier* may be reached direct from *Sion* by the *Val de Nendaz*, crossing the rugged ridge immediately N. of the village. The distance from hence to the end of the *Val de Bagnes* is at least 16 m., and there is probably none other in Switzerland which is for so great a distance devoid of permanent habitations. Those who merely mean to pass through the valley over the *Col de Fenêtre*, do not absolutely require a local guide; but if such be wanted, it is prudent to engage one at Chables or at *Lourtier*. *Bernard Trolliet* was considered the best chamois hunter, and therefore the best guide for difficult expeditions. He is now rather past the age for active exertion.

The same may be said of *Benjamin Felley*, who was guide to Mr. W. Mathews and M. G. Studer in some of their expeditions in this district. A younger brother of the latter, by name *Maurice Felley*, and another man with the same surname—*François Louis Felley*—are probably the best. As the natives are often engaged in summer at distant chalets, a stranger must be prepared for some delay.

Above *Lourtier* the path keeps to the rt. bank, while the *Dranse*, charged with the drainage of ten considerable glaciers, forces its way through a gorge narrower than those which have been passed in the lower parts of the valley. In little more than $\frac{1}{2}$ hr. the path reaches some chalets called *Granges Neuves* (4,843'), where the considerable stream from the *Glacier de Corbassière* joins the *Dranse* (Rte. E). To the S., in the angle between the two streams, is the summit of the *Becca de Corbassière* (8,891'), which must command a fine view of the surrounding peaks and glaciers. [A little farther on a track turns off to the l., and leads over the *Col de Severen* to the *Chalets de la Barma* in the *Val Hérémenne* (§ 19, Rte. C). Information as to that pass is desired.] In about $1\frac{1}{2}$ hr. from *Lourtier* the traveller reaches the *Pont de Mawoisin*, a solid stone bridge over the *Dranse*, which is here crossed, and the way thenceforward continues along the l. bank. Near to the bridge it is proposed to build an inn, which might far more advantageously be placed at the head of the valley. The *Mont Pleureur* (12,159') now becomes a conspicuous object on the E. side of the valley, and through a narrow channel on the S. side is seen the lower end of the *Glacier de Gétroz*, fed by the overflow from a vast plateau of névé that is not visible from below. This glacier has obtained a sad celebrity from the formidable catastrophes of which it has been the cause. In 1595 it had descended into the valley, and formed a barrier behind which the waters accumulated until they

burst, and swept through the valley below, carrying off 140 human beings with many houses and cattle. In the spring of 1818 the glacier again flowed down into the valley, forming a dam 400 ft. high, behind which the waters of the Dranse soon grew into a lake nearly $1\frac{1}{2}$ m. in length. A renewal of the former calamity seemed inevitable when an eminent engineer, M. Venetz, undertook to avert it by driving a tunnel through the ice-barrier. History records no nobler example of courage and endurance than that of the brave men who for 34 days worked day and night, in momentary peril of destruction, until the work was completed just as the waters of the lake had reached the level of the tunnel. The flow of water rapidly enlarged and lowered the opening, and in less than three days two-fifths of the water had safely run off through the customary channel of the river. In the mean time, however, the dam had been weakened by the excavating action of the current, and on June 16 it suddenly gave way. In half an hour, a quantity of water, five times greater than that of the Rhine at Basle, where it carries down the drainage of nearly all the Swiss Alps, rushed through the breach and down the narrow valley. An eye-witness, who viewed the scene near St. Branchier, assured the writer that the appearance of the flood was that of a huge dark mass of trees filling the width of the valley, and advancing with the speed of a railway train, at first exceeding 25 miles an hour. After reaching the main valley at St. Branchier, the fury of the flood was partially arrested, but it continued to spread destruction far and wide, and to bear down its burden of huge blocks of stone, trees, cattle, houses, and débris, to the valley of the Rhone, many miles below Martigny. After repeated warnings most of the inhabitants had repaired to places of safety, but 34 were carried away, along with 400 houses, all the bridges over the Dranse, and large numbers of cattle. More per-

manent mischief was done by the masses of stone and gravel that still lie over most of the fields in the lower level of the valley even below Martigny. One transported block of stone, still pointed out, is estimated to weigh nearly 200 tons.

The impending danger of a renewal of the same catastrophe has since 1818 been averted by a simple and ingenious device originated by M. Venetz. A stream of water at a temperature even but little over the freezing point acts as a saw which rapidly cuts through glacier ice. Hence, by conducting the streams from the mountains on either side in wooden troughs, the accumulated masses of ice and frozen snow are cut up into huge blocks which fall into the Dranse, and are soon carried away, and melted by the current. Men are still frequently employed in summer to conduct this operation.

The path now lies across the temporary bed of the lake, and in about 1 hr. farther reaches the *Châlets de Torembe*, which are said to offer the best night-quarters for a traveller in the upper part of the valley. The scenery here assumes a character of grandeur. The glacier of *Lirerouge* to the east, and another on the west side of the valley lying on the slope of the Becca de la Liaz—*Glacier de Bocaresse*—are scarcely seen from below, but opposite to the chalets of Vingt-huit, where the track returns for a short time to the rt. bank, is the fine *Glacier de Zessetta*, descending from a hollow on the N. side of the *Tour de Boussine*, a great buttress of the Grand Combin here rising above the valley in formidable precipices of black rock. A short distance higher up, the still more extensive *Glacier de Breney* flows down from the SW. face of the *Pigne d'Arolla* (12,471'). Professor Forbes was informed that in 1822 this glacier had crossed the Dranse and reached a considerable height on the opposite bank. In 1856 Mr. Mathews found that it had retreated, leaving behind vast piles of rubbish. A little farther on, the *Glacier*

du Mont Durand has formed a permanent ice bridge across the Dranse, which flows through a natural tunnel beneath it. This great glacier is more fully noticed in Rte. F; its lower end is crossed in order to reach the *Châlets de Chermontane* (7,316'), a considerable establishment, where nine herdsmen are employed in summer in tending a large number of cattle and sheep, and in making cheese. The season is a very short one, extending only from the beginning of July to the latter end of August. Travellers who have passed here have been hospitably received, but they have found none but the most meagre fare, and all report the great difficulty of sleeping in quarters where the most discordant noises are continued throughout the night. The site, however, offers attractions to the mountaineer which are scarcely surpassed elsewhere in the Alps. Besides the two great glaciers already mentioned, there is the Glacier de Fenêtre, leading to Aosta, and the great Glacier d'Otemma, one of the finest in the Alps, over which lie three different passes, described in Rtes. K and L. There are besides three peaks within easy reach which must each command an unusually interesting view. Of these the *Pic d'Otemma* (11,513'), though apparently reached by Bernard Trolliet, does not seem to have attracted Alpine travellers. The *Mont Gelé* (11,539') is described in connection with the Col de Crête Sèche. The easiest of access is the *Mont Avril* (10,961'), lying W. of the track to the Col de Fenêtre, and overlooking the Glacier du Mont Durand. The ascent over loose shattered slate is rather tedious, but free from difficulty. The view of the Grand Combin rising on the opposite side of the great glacier is remarkably fine.

The ascent from the *châlets* of Chermontane to the *Col de Fenêtre*, in part over the glacier of the same name, is easy; to reach the Col from below fully $1\frac{1}{2}$ hr. is required, but less than an hour suffices for the descent to Chermontane. The Glacier de Fenêtre now

approaches within 200 or 300 yards of that of Otemma, but it appears that in 1841, when Professor Forbes passed here, the two glaciers united their frozen streams.

The view from the Col de Fenêtre (9,141') is extremely fine, especially on the side of Italy, commanding all the higher summits of the Graian Alps from the Mont Emilius to the Rutor. Immediately below lies the deep valley of *Ollomont*, enclosed by rugged ridges which descend from the Mont Gelé and the Mont Avril. The track skirts the base of the former peak, a grand object from this side, and passes a small lake, before reaching the Alpine pastures which rapidly lead down to the *châlets* of Balme. A mule-path descends thence by Les Veaux and *Ollomont*, where there are remains of a Roman aqueduct, to *Val Pellina* (Rte. G), only 8 m. from Aosta (§ 15, Rte. A).

ROUTE E.

CHABLES TO ST. PIERRE, BY THE COL DE LA MAISON BLANCHE — ASCENT OF THE GRAND COMBIN.

The Grand Combin, which yields in height to no European mountains save Mont Blanc and the great peaks that circle round Zermatt, was long one of the least known of Alpine summits; and even now the great glacier of Corbassière which streams from its northern face is personally known to none but a few enterprising mountaineers. The first to commence the exploration of the great mass which separates the Val de Bagnes from the Val d'Entremont was M. Gottlieb Studer, of Berne, who in 1851 reached for the first time the summit of the Combin de Corbassière, and has published an account of that and a subsequent excursion in 'Berg-und Gletscher-Fahrten.' He was followed in that ascent five years later by Messrs. W. and C. E. Mathews, and in 1857 the former gentleman anticipated M. Studer in the ascent of the second

peak of the Grand Combin. After this ascent had been several times repeated, some hunters of St. Pierre discovered a way from the Val d'Entremont, and a Swiss gentleman, named Deville, under their guidance reached the higher or southern peak in 1860, followed in the same year by an English officer. Several points connected with the topography of the mountain have been made out so lately that G. Studer's description, published in 1859, although the most complete yet published, is in many respects quite incorrect. It was formerly supposed that the watershed between Piedmont and Switzerland ran up close under the highest peak of the mountain, and it is so represented in Studer's map. Mr. Mathews was led to doubt this opinion, and to suppose the existence of a pass from the Corbassière Glacier to that of Mont Durand. In a subsequent expedition, with Mr. F. W. Jacomb, he ascertained that the supposed pass does not exist, since the ridge at the head of the Corbassière Glacier overlooks, not the Gl. du Mont Durand, but a branch of the Valsorey Glacier, from which it is separated by seemingly impracticable precipices. On the next day Mr. Jacomb crossed for the first time the Col de Sonadon, connecting the Valsorey with the Glacier du Mont Durand, and thus ascertained that the Combin is separated from the watershed towards Italy by the whole length of the ridge between those two glaciers.

The topography of the Combin is intricate, and only to be clearly understood by reference to a correct map or model. Between the Val d'Entremont and the Val de Bagnes are two high ridges, nearly parallel to each other and to those valleys, which both diverge from a short transverse ridge of great height. The S. end of the space enclosed between these three ridges is an elevated plateau of great extent, where the névé accumulates that feeds the *Glacier de Corbassière*, which descends thence for several miles to the N.

At the SE. extremity of the plateau the highest part of the enclosing ridge

is surmounted by two conical summits, of which the higher SW. point is 14,164 ft. in height, while the neighbouring NE. summit is lower by less than 100 ft. The SW. corner of the plateau lies at a considerably lower level, and over this lies the Col de la Maison Blanche, by which access to Corbassière is obtained from the side of Valsorey. Seen from the S. and E. sides, the highest ridge of the Combin rises in seemingly inaccessible precipices, but the actual summit is not easily identified. The ridge separating the glaciers of Mont Durand and Sonadon diverges to the SW. from the mass of the Combin, and appears to be continuous with the range of the Aiguilles Vertes, or Aiguilles de Valsorey, and that of the Vêlan. From this diverges the lower range, which divides the channel of the Glacier du Mont Durand from the Piedmontese Val d'Ollomont, and extends by the Col de Fenêtre to the Mont Gelé.

It is right to add, that the Grand Combin is known in the Val de Bagnes by the name *Graffeneire*, or *Grafioneyre*, while the name Grand Combin is given to a much lower summit on the W. side of the Glacier de Corbassière, called on several maps Petit Combin, but better distinguished as *Combin de Corbassière*. A third peak, which is marked as *Les Follats* in Studer's map, and is known as Dent du Midi in some part of the Val d'Entremont, is called by the people of Bagnes Petit Combin.

The demand made by the Bagnes guides in the early ascents of the Grand Combin was 30 fr. each, which may be considered fair pay, as in ascending from that side it is necessary to employ the greater part of two days, sleeping at the *Châlets de Corbassière*.

After following the main track up the Val de Bagnes from Chables to *Granges Neuves*, where the stream from the Corbassière Glacier joins the Dranse, the traveller keeps on the same path to the next group of châlets, called Plan Praz, and then, after crossing the Dranse by a wooden bridge, commences the ascent

along the base of the Becca de Corbassière. The lowest châteaux are somewhat below the glacier, but the principal group lies above its E. bank, and commands a very fine view of the Grand Combin, and the range on the opposite side of the glacier, whose highest summit is the *Combin de Corbassière*. This may be reached in 6 hrs. from the châteaux. The only difficulty lies in crossing the bergschrund at the base of the steep E. face of the peak, and towards the highest crest, which is a narrow and very sharp snow-arête.

There is a passage called *Col des Pauvres* leading from the Châteaux de Corbassière to the middle region of the Val de Bagnes. By bearing to the rt. along the slope of the Montagne de Bocaresse, Mr. Mathews reached the châteaux of *Torembe* (Rte. D), without the labour of descending direct to the valley, and then remounting the track to Torembe.

The accommodation at Corbassière is very limited, and Mr. W. Mathews with his brother, in his first visit to this place, found it advisable to sleep for two nights under a huge boulder near at hand, which is turned to the same account by the herdsmen. Somewhat higher up there is a small stone hut at the base of a cliff, which in subsequent expeditions to the Grand Combin was used for sleeping quarters by Mr. Mathews and M. G. Studer.

Along the E. side of the glacier are two ancient moraines, marking its former limits; the farther of which is now coated over with vegetation, and affords the easiest way for ascending along this bank. The middle and upper part of the glacier abutting against the upper ridge of the Grand Combin is described as exhibiting an appearance of extraordinary confusion. Huge *séracs*, with a net-work of wide crevasses intervening, form a labyrinth which severely tries the skill and endurance both of guides and travellers. Mr. Mathews, who made the ascent after a heavy fall of fresh snow, found 11 hrs. of actual walking necessary to reach the summit

from the highest hut; and his chief guide, Auguste Simond, suffered afterwards from the severe exertion. M. Studer, under more favourable circumstances, employed more than 9 hrs.; and in each case the second peak, not the higher and more distant summit, was attained. The course lies towards the Col de la Maison Blanche until within about 1 hr. of the summit of the ridge, and then bears to the l. to reach the higher terrace of the snow-plateau which forms the proper ridge of the Grand Combin. Both the earlier explorers of the mountain were unfortunate as to weather, and no published account gives full particulars of the form of the highest ridge.

If the object be merely to reach St. Pierre across the upper basin of the Glacier de Corbassière, the traveller may attain the *Col de la Maison Blanche* (11,212') in 5 or 6 hrs. from the highest hut. Messrs. Mathews and Jacob went in 50 min. from the Col to a point in the ridge to SSE., about 500 ft. higher, which overlooks a grand amphitheatre of rock and ice-cliff opening into one branch of the Glacier of Valsorey. The view from this point is very grand, including a large portion of the panorama seen from the highest peak. A short distance below the snowy ridge which forms the Col de la Maison Blanche, commences a steep descent, in which rocks alternate with couloirs and snow-slopes, presenting no difficulty to practised mountaineers. At the base of the rocks the descent continues, and finally gains the banks of a tributary stream flowing SW., and joining that from the Valsorey Glacier (Rte. G), about $1\frac{1}{4}$ hr. above St. Pierre. Above the junction is the highest chateau in the valley. In ascending to the Col, Messrs. Mathews and Jacob employed 5 hrs. 20 min., and in descending 4 hrs. 20 min.

The experience gained in the latest ascents of the Grand Combin shows that until a hut shall be built far up on the rt. bank of the Corbassière Glacier, it will be far better to attack the mountain from the Maison Blanche side.

Sleeping at the above-mentioned chalet in the Valsorey, 7 or 8 hrs. may probably suffice for the ascent under moderately favourable circumstances; leaving time to reach St. Pierre in the evening, or to descend to Corbassière. In taking the pass of the Maison Blanche between St. Pierre and Chables, there would also be some advantage in starting from the former place rather than from Corbassière, except that the difficulty of descending through such intricate crevasses as those of the upper part of the glacier is generally greater than that of ascending. Under favourable circumstances it might be possible to reach Chables in one long day of 14 hrs.' walking, exclusive of halts.

M. G. Studer discovered another pass from Corbassière to the Val d'Entremont by the N. side of the Combin de Corbassière. He descended to *Alène*, between Liddes and St. Pierre (Rte. A) by the N. side of the *Glacier de Boveire*, and over the *Montagne des Cœurs*. It is apparently less interesting, but also shorter than that of the Maison Blanche.

ROUTE F.

ST. PIERRE TO CHERMONTANE, BY THE COL DE SONADON.

This pass, which is probably destined to future importance amongst mountaineers, as it lies in the direct line of communication between Zermatt and Chamouni, was first made in 1861 by Mr. F. W. Jacomb, a member of the Alpine Club, whose name frequently recurs amongst the explorers of the Pennine Alps, accompanied by the well-known brothers, J. B. and Michel Croz of Chamouni. Three weeks later it was passed for the second time by the Rev. J. F. Hardy and three friends.

The way from St. Pierre lies along the rt. bank of the Valsorey torrent to its junction with the stream from the

Col de la Maison Blanche mentioned in the last Rte. Instead of turning by that stream to NE., the way still lies SE., passing the highest chalet, and about 10 min. farther, and near the lower end of the glacier, reaches a projecting rock, which appears to bar the valley. The herdsmen have cut a path by which the summit of the rock is reached in 15 min., and the track continues along the slope, high above the end of the Valsorey Glacier. In 2¼ hrs. from St. Pierre Mr. Jacomb reached a point commanding a fine view of the junction of the main *Glacier de Valsorey* with the *Glacier de Sonadon*, which it receives from the E., and with the *Glacier de Tzeudet*, which joins it a little lower down from the SW. In the fork between it and the latter is the little glacier lake, *Goille à Vassu*, mentioned in Rte. C. Immediately opposite, between the ice-streams Valsorey and Sonadon is the range of the *Aiguilles Vertes*, or *Aiguilles de Valsorey*, linking the *Grand Combin* with the *Vélan*. At the NE. end of this ridge, very near to the Combin, is the slight depression which forms the *Col de Sonadon*. From this point of view it is seen that the *Glacier de Sonadon* is cut across by an impracticable ice-fall and by smooth and nearly vertical rocks, so that the only way to reach its upper level is to climb along the face of the steep rocks which overhang its N. bank. This has been found by the earlier explorers a matter of some difficulty, the rocks being very steep and the risk from falling stones not inconsiderable. It is likely that as it is better known the guides will find out the most convenient track, and avoid some of the difficulty. Several attempts made by Mr. Hardy's party, composed of excellent mountaineers and first-rate guides, to descend by the middle or SE. corner of the glacier utterly failed.

When once the upper level of the glacier has been reached, the difficulties of the way are over. 1½ hr. ascending over snow-slopes suffices to reach the Col.

Mr. Jacomb, who is a fast walker, employed $6\frac{1}{2}$ hrs., including a short halt for breakfast, to reach the Col from St. Pierre. He estimates the height at 11,483 ft. To the N. rises the rocky face of the Grand Combin, while to the E. the *Glacier du Mont Durand* descends in a gentle curve convex to the S., where it is guarded by the *Tête de By* and the *Mont Avril*. Beyond it rises the great *Glacier d'Otemma*, between the *Mont Gelé* and the *Pic d'Otemma*, and to the N. of the latter peak the *Glacier de Breney*.

The upper part of the *Glacier du Mont Durand* is quite free from difficulty, but it has two considerable ice-falls, one of them at about its mid-length opposite the *Mont Avril*, the other lower down, where it descends into the head of the *Val de Bagnes* opposite to the *châlets* of *Chermontane*. To pass the higher fall, Mr. Hardy and his party found it expedient to keep to the rocks on the l. or N. bank. Below the fall there is no difficulty in traversing the glacier diagonally, so as to gain the NE. slopes of the *Mont Avril*, by which the descent is completed, passing but a short way below the path to the *Col de Fenêtre*. 3 hrs. are probably quite sufficient for the descent to the *châlets*, so that, under favourable circumstances, $9\frac{1}{2}$ hrs., exclusive of halts, may be allowed for this fine pass.

[Mr. Jacomb, instead of descending to *Chermontane*, crossed the ridge of the *Tête de By*, descending by the *Châlets de By* to *Ollomont*, and thence to *Aosta*. Those mountaineers who have not already made the ascent of the *Vélan*, will probably prefer the way indicated in Rte. C as a glacier route from *St. Pierre* to *Aosta*. To judge from the brief particulars stated in 'Peaks, Passes, and Glaciers,' Mr. Hardy found a different, and probably an easier pass, to *Ollomont*, lying farther E. than that taken by Mr. Jacomb, but as he did not descend that way, the question remains open for future explorers.]

ROUTE G.

AOSTA TO ZERMATT, BY THE VAL PELLINA AND THE COL DE LA VAL PELLINA.

	Hrs.' walking	Eng. miles
Valpellina (Village)	$2\frac{1}{2}$	8
Orace	$1\frac{1}{2}$	5
Biona	$1\frac{1}{2}$	$3\frac{1}{2}$
Prarayen	$3\frac{1}{2}$	$10\frac{1}{2}$
Zermatt by Zard- zan Gl.	$10\frac{1}{2}$	22
	<hr/> $19\frac{1}{2}$	<hr/> $49\frac{1}{2}$

Although discovered only in 1860, by Mr. F. W. Jacomb, accompanied by *Johann Kronig* of *Zermatt*, the pass described in this Rte. is already frequented by the more adventurous class of mountaineers. Nor is this surprising; the scenery of the *Val Pellina* is worthy to compare with that of those exquisite valleys of *Monte Rosa* described in § 20. It is connected by six glacier passes with the adjoining valleys to the N. and E. Of these the grandest is that leading to *Zermatt*, which has besides the great advantage of offering the only direct rte. from *Aosta* to *Zermatt*, by which the latter place may be reached in two days from *Courmayeur*, starting very early in a char for *Aosta*, and continuing the journey by *Valpellina* to *Prarayen*, and thence, next day, to *Zermatt*.

Fine weather, and a thoroughly good guide, are indispensable for the pass. It is now known to several of the best *Valais* guides — *Johann Kronig*, *Peter Perrn*, *Moritz Andermatten*, *J. J. Benen*, &c., as well as to *Michel Payot*, and possibly some others of the best *Chamouni* guides.

There is a road practicable for a char from *Aosta* to the village of *Valpellina*; but even in descending it involves a loss of time, as it is extremely rough. It passes by *Roisan* along the E. bank of the *Buttier*. The writer believes that the best way is to follow the road of the *St. Bernard* nearly to *Gignod*, then to cross the *Buttier*, and follow the l. bank of the stream till close to the village, where the road returns to the opposite bank.

Valpellina (Rte. D) stands at the junction of the *Val d'Ollomont* with the main branch of the Buttier descending from the Val Pellina. The situation is extremely beautiful, but the village is discoloured by large copper-works. It contains two poor inns, of which the *Hôtel des Mines* appears the better, but, except by accident, meat is not to be had. Here is the opening of the Val Pellina, a deep trench exactly parallel to that of the *Allée Blanche*, and of about the same length — 18 English m. The scenery is throughout of the first order, especially towards the head of the valley, and nothing but a tolerable mountain inn at Prarayen is wanting to make it one of the chief resorts of Alpine travellers.

The first village is *Oyace*, standing on a promontory of rock connected with the base of the *Mont Gelé*, at a great height above the torrent. The *curé* here is willing to give lodging to one or two travellers, but the accommodation is limited, and by no means inviting. The track continues along the N. side of the valley from thence to *Biona*, the second and last village, where in case of need better accommodation than that at Oyace may be found at the *curé's* house; but he is often absent at some of the numerous outlying hamlets, and the inhabitants have been hitherto shy, though not ill-disposed towards strangers. The passes leading from this part of the valley to St. Barthelemy are noticed in Rte. H, and the Col de la Crête Sèche to Chermontane in Rte. K.

The flora of the Val Pellina well deserves more examination than it has yet received. *Silene valesia* is common about Biona, and the warm slopes on the N. side of the valley seem to promise much variety. They should be visited in June or July.

Above Biona the valley mounts by a tolerably continuous and gentle ascent, through scenery constantly increasing in grandeur, till the mule-track reaches *Prarayen*, a group of châteaux just beyond the opening of the

Combe d'Oren (§ 19, Rte. A), the only considerable lateral valley connected with the Val Pellina. There is another group of châteaux somewhat farther up the valley; the same herdsmen resort alternately to one or the other, and travellers report favourably of the hospitality with which they have been received by them. The resources of the establishment are confined to milk, cheese, butter, and *brousse*, with polenta and black bread, unless the larder happen to be enriched by the slaughter of a marmot. The lower châteaux stand at 6,588 ft. according to Forbes.

The head of the Val Pellina is closed by the *Glacier de Zardezan*, which forms a great ice-fall, apparently barring all passage in that direction. It occupies the main channel of an upland valley lying between a range that runs N. from the *Pointe de Zardezan*, through the *Dents de Bertol* (12,412'), and several intermediate peaks, to the *Aiguille de la Za* (12,051'), and a nearly parallel range, extending from the *Dent d'Hérens* (or *Dent de Rong*) to the *Château des Dames*. The first of these ranges divides the Zardezan Glacier from the *Combe d'Oren*, and the basin of the *Arolla Glacier* from that of the *Glacier de Ferpècle*. The second extends to the S., along the W. side of the Val Tournanche, and sends out a massive branch which divides the Val Pellina from that of St. Barthelemy. About $\frac{3}{4}$ hr. above Prarayen is a little chapel and a solitary châtlet, the last in the valley, beside a little knoll crowned by the remains of a wooden cross. The view is even finer than that from Prarayen, but the *Glacier de Zardezan* which mounts towards NNE. is concealed, though near at hand, by a projecting buttress of the mountain.

Starting from this châtlet, $\frac{1}{2}$ hr. takes the mountaineer across the pastures and rough ground forming the head of the valley, and, ascending steeply the western slopes, he crosses the lateral moraine on to the Zardezan Glacier. On the western slopes above is the cattle alp, one of the wildest to

be found. The glacier descends in an almost straight and tolerably level course from the N., bounded on the west by the black precipices extending from the Pointe de Zardezan to the Dents des Bouquetins, whilst, on the east, stretches up a wilderness of snow slopes and rocks towards the Dent d'Érin, seamed by three secondary glaciers flowing into the Zardezan, and the bases of which are successively passed. The third is of great breadth, and the medial moraine formed by the junction is strongly defined. Looking back, down the glacier, the Château des Dames (Rte. I) rises imposingly. At the end of 2 hrs., the ice-cliffs separating the lower level of the glacier from the névé above are approached; here the mountaineer must leave the glacier, and turn north-eastwards towards a gap in the ridge of rocks bounding the ice-fall on the east. These rocks are called Papilles Rouges on some maps; on others, the Dents des Bouquetins, but this latter name is more properly applicable to the range on the west side of the ice-fall. After crossing the lateral moraine, you climb up steep slopes of snow, dotted with patches of rock, affording fine specimens of *Gnaphalium leontopodium*. In an hour a kind of couloir, half glacier and half snow-slope, is reached. Passing up this and the rocks above, interspersed with ice-slopes, and occasionally requiring the use of the axe, the gap in the rocks is gained in little more than 5 hrs. from Prarayen. The mountaineer is now at the edge of the extensive névé of the Zardezan, forming an undulating plateau or basin, which falls away to the NW. above the ice-fall.—[F. W. J.]

[An opening on the W. side of the snow-field immediately N. of the Pointe de Zardezan had been observed to correspond with a similar Col lying at the head of the main or SE. branch of the Arolla Glacier, and Mr. Tuckett, Sir T. F. Buxton, and others pointed out the probability that a pass might be effected in this direction, uniting Zermatt with the Châlets d'Arolla. The

new pass, which may best be called *Col de Zardezan*,* was effected in 1862, by Mr. C. H. Pilkington and two other English travellers. Keeping round the head of the Glacier de Zardezan, they passed the ridge without difficulty, and reached the Châlets d'Arolla (§ 19 Rte. A) in about 6 hrs., rather fast walking, from the Col de la Val Pellina.]

‘On the farther side of the basin, and almost due N., is the ridge leading up to the snowy summit of the Tête Blanche, to the SE. of which, yet hid from view, is the *Col de la Val Pellina* (11,687', Buxton). On the rt. hand, or E., descends a secondary glacier, broken up in front by *séracs*. Crossing the névé towards the Tête Blanche, and ascending rapidly, the Col de la Val Pellina is gained in $1\frac{1}{4}$ hr. from the summit of the rocks.’—[F. W. J.] By bearing to the l. across the ridge connecting the Tête Blanche with the Dents de Bertol, the traveller may cross the Col des Bouquetins leading to Evolena (§ 19, Rte. B).

In making the first passage of the Col de la Val Pellina Mr. Jacomb found time to ascend (in about $\frac{3}{4}$ hr. from the col) the Tête Blanche (12,304'), a snowy pyramid lying between three glacier passes that intersect the vast snow-fields from whence the glaciers of Zmutt, Ferpècle, and Zardezan diverge at about equal angles. ‘The ascent lies all the way over snow, and the summit is a ledge of snow wreathed up by the wind into a cornice. Owing to its central position in the vast snow and ice country around, there are few positions so easy of attainment which can display such a magnificent scene. Besides the well-known view from the Col d'Hérens (§ 19, Rte. D), it affords a prospect in two directions which that col cannot: viz., first, on the side which the mountain itself conceals, embracing the line of familiar peaks stretching SW. to Mont Blanc; and next, to

* Since the above was written, Mr. Pilkington has described the new pass by the name Col du Mont Brulé.

the NE., towards the wondrous Dent Blanche and sharp-peaked Weisshorn, with the Bernese Oberland beyond. In front is the mighty obelisk of the Matterhorn, with, nearer still, the Dent d'Érin, little less in height; whilst, beyond, the eye ranges over the many other well-known mountains and glaciers of the Monte Rosa district. The summit of Monte Rosa, however, is concealed by the Matterhorn.

'Leaving the col, 1 hr.'s careful work is required in descending some treacherous névé, and winding through magnificent crevasses and *séracs* to join the snow-slopes of the Col d'Érin, a short distance above the Stockje, the track of which is followed over the Zmutt Glacier to Zermatt.'—[F. W. J.] (See § 19, Rte. D.)

To reach the col from Prarayen 6½ hrs.' steady walking will suffice, and 4 hrs. for the descent. In ascending from Zermatt 7 hrs. should be allowed to the summit, and 3½ hrs., or rather more, for the descent.

ROUTE H.

ST. BARTHELEMI TO THE VAL PELLINA.

About half-way between Aosta and Châtillon, near the village of Nus, a mountain torrent descends from the N. to join the Dora Baltea. This drains the *Val de St. Barthelemi*, and one or two short tributary glens, a district very little known to strangers. The only recent notice of the valley is contained in King's 'Italian Valleys of the Pennine Alps.' Mr. King traversed but one of the three passes connecting the valley with the Val Pellina, and very little information respecting the others has reached the editor.

The village of *St. Barthelemi* is about 2 hrs. above Nus (§ 20, Rte. I). Three passes lead hence into the Val Pellina. Reckoning from E. to W., the first of these is the Col de *Luseney*, also called *Col de Levornea*, said to approach 10,000 ft. in height. This is

the most direct course for Prarayen, as it descends into the Val Pellina about 1 hr. below that place.

The second pass is the *Col de Montagnaia*, reached from St. Barthelemi by the Châlets de Baravei. The ridge forming the southern boundary of the Val Pellina is said to be here passable at two points, of which that lying most to the E. is sometimes used by the people of both valleys. The height, according to M. Carrel, is 9,630 ft.

Both the above-named passes are reached by the main branch of the Val de St. Barthelemi, which originates on the E. side of the Mont Faroma (10,062'). On the W. side of this mountain lies another pass, easier and more frequented than the last, leading to Oyace (Rte. G). This is called *Col de Vessoney*, and sometimes Col de St. Barthelemi. It was crossed from the N. side by Mr. King, and the following is, for the most part, abridged from his account of the excursion.

Below Oyace a steep path leads down to a bridge, bearing the date 1688, which crosses the deep and dark gorge of the Buttier. The track then mounts steeply to the E. under larch trees, before long gaining a view of Biona, and of the high ranges on either side of the Col de la Crête Sèche (Rte. K). The course now lies through a glen wherein soft turf and moss-grown rocks alternate with pine forest. *Aquilegia alpina* is here abundant. The glen terminates in a green plain, the former bed of a lake, where stand the châlets of Vessoney. This little plain is surrounded by an amphitheatre of rocks, those to the S. being jagged and very steep. The way lies through enormous fallen blocks, amidst which grow gigantic larches, and then through a ravine. The larch gives place to the arolla pine before reaching a desolate hollow, where stand the upper châlets of Vessoney. About ½ hr. higher up the path becomes impracticable for mules, and 1 hr. farther suffices to reach the col by a faintly-marked track over débris and shattered edges of slaty rock.

The col is about 8,200 ft. in height, and commands a noble view, extending from Mont Blanc to the Crête Sèche, and on the other side of the Mont Faroma, including some portions of the group of Monte Rosa. The descent is tolerably easy from the col to a wooded glen that falls SE. to join the main valley, close to the village of St. Barthelemi. This contains no inn, but Mr. King found good accommodation at the house of the *curé*.

ROUTE I.

PRARAYEN TO VAL TOURNANCHE, OR BREUIL, BY THE COL DE VACORNÈRE—ASCENT OF THE CHÂTEAU DES DAMES.

The editor has received some notes of this pass from Mr. A. T. Malkin, and the pass, including the first ascent of the Château des Dames, is described by Mr. F. W. Jacomb in the second series of 'Peaks, Passes, and Glaciers.' The latter gentleman was accompanied by Johann Kronig, of Zermatt, and by Gabriel Maquigney, of Breuil, of whose qualifications as an ice-man he gives an unfavourable report. This is a short, steep pass, without difficulty to the practised mountaineer, and interesting from the fine views of the main range between the Dent d'Hérens and the Mont Gelé.

The ascent commences about 1 m. below the highest chalet in Val Pellina (mentioned in Rte. G), and a rather greater distance above the principal chalets of Prarayen. A plank crosses the Buttier, and a track mounts in a gorge through pine forest to the first step in the lateral glen leading to the pass, already commanding a noble view of the opposite range. Above this is a steep gorge, mounting about due E. Mr. Jacomb, in descending from the col, kept rather high up on the N. side of this gorge, but advises future travellers to take a more direct course, availing themselves for some distance

of a channel by which water is led to the pastures below. This seems to have been the course taken by Mr. Malkin, who describes the lowest part of the ascent as a chimney. In either case a stiff climb over rock, alternating with steep grass-slopes and débris, leads up to the last portion of the ascent, which lies through a snow couloir, long and rather steep, fatiguing to mount, but easily descended by a glissade. The height of the col, according to M. Carrel, is 10,335 ft. — perhaps too high an estimate. It is known by the name *Col de Vacornère*, and also, it would seem, as *Col Courgnier*, both having the same derivation.

The *Château des Dames* lies NE. of the pass, and, though decidedly difficult of access, is well worth a visit for the noble view which it commands. About 1 hr. from the col, chiefly over snow broken by projecting rocks, the traveller may reach the base of the peak, where the baggage may be deposited. A steep snow-slope leads NE. to a line of serrated rocks, not seen from below, which stretch N. towards the summit. 'It is necessary to climb along the base of these rocks until they can be themselves traversed, in order to avoid the ice-slope below, which here falls away very sharply to the E., and ends in a precipice. The rocks are very loose and "pourris," and blocks are occasionally detached, and at times the mountaineer must leave them, and cut his way along the ice-slope. On reaching the end of the rocky ridge he will see the summit of the mountain, not very high above, but separated from him by an extremely sharp arête of snow, which would be dangerous on a windy day. This passed, a short snow-slope leads to a little group of rocks cropping out from the snow, and forming the summit of the mountain, something less than 12,000 ft. high. It may be reached in less than 3 hrs. from the point where the baggage was left. From its central position the mountain commands an extensive view, especially westwards, in which direction the eye

enfilades a line of snowy peaks for nearly 50 m. away towards Mont Blanc himself. Amongst these are the Vêlan and Grand Combin, and nearer the Mont Gelé, Otemma, Arolla, Collon, and others. To the S., nearer at hand, a remarkable snow-cone rises out of the ridge.—[F. W. J.]

After returning to the base of the peak the traveller may descend direct, without returning to the col, winding round the N. side of the steep slopes that enclose the head of the glen below, and reaching the under-mentioned gap in the ridge leading to Breuil.

Below the Col de Vacornère a small glacier stretches down for a short distance, and is followed by a steep but not difficult descent over rocks, snow-slopes, débris, and Alpine turf, leading to a wild glen, apparently closed in the direction of the Val Tournanche by a ridge stretching from N. to S. The drainage of this glen is carried down a gorge to the rt. leading a little E. of S., by another steep descent, into a short and nearly level upland valley, where stand the châteaux of Chignana. The torrent from this valley joins the main stream a little below the village of *Valtournanche* (§ 20, Rte. B). A mule-path leads from the châteaux to that village.

The way to Breuil lies E. from the foot of the pass to a gap, called *Col de Dza*, in the ridge before mentioned, from whence a track leads NE. over Alpine pastures, crossing two torrents in the way, until it reaches the main stream of Val Tournanche, here crossed by a plank bridge, about 1 m. below the comfortable inn of *Breuil* (§ 20, Rte. B).

From 6 to 7 hrs., exclusive of halts, suffice for this pass, the distance to Breuil or Valtournanche being about the same, but 5 hrs. must be added in case the traveller should ascend the Château des Dames.

ROUTE K.

CHERMONTANE TO PRARAYEN, BY THE GLACIER D'OTEMMA—ASCENT OF THE MONT GELÉ.

To the E. of the châteaux of Chermontane (Rte. D) lies the great *Glacier d'Otemma*, also called *Glacier de Chermontane*, the finest of those flowing into the Val de Bagnes. It is about 6 m. in length by $\frac{3}{4}$ m. in breadth, expanding at the summit into a great field of névé, which also feeds the *Vuibez Glacier* to the E. Like the *Glacier du Mont Durand*, it is convex to the S., descending at first to the SW., and bent round till, at its base, it flows somewhat N. of W. On the S. side it is guarded by a steep and lofty ridge, whose main summits are the *Mont Gelé* (11,539'), and the *Trouma des Boucs* (11,149'). E. of the latter peak a succession of headlands of rock, divided by steep tributary glaciers, completes the barrier.

The equally steep range on the N. side is crowned by the *Pic d'Otemma* (11,513'), the *Pigne d'Arolla* (12,471'), and by several intermediate summits. On the faith of statements made by hunters of the Val de Bagnes it had been believed by the few travellers who have traversed this district that the upper part of the glacier was barred by an impassable ridge of rocks, called *Crête à Collon*, forbidding all passage from Chermontane to the basin of the Arolla. This is represented on Studer's map of the southern valleys of the Valais; but first by Mr. Tuckett, who traversed the Col de la Reuse de l'Arolla in 1861, and a few weeks later by Sir T. F. Buxton and his companions, in making the new pass of the Col de Chermontane, the existence of any such barrier was finally disproved, and a great service rendered to Alpine travellers by the opening up of one of the grandest highways through the Pennine Alps.

Two passes only have yet been discovered across the range which sepa-

rates the Glacier d'Otemma from the Valpellina. One of these has long been known, though rarely used. It lies across a depression between the Trouma des Boucs and the Mont Gelé, and is called Col de Crête Sèche. The other is the new pass above mentioned, discovered by Mr. Tuckett. Mr. Jacomb, who, in 1861, reached by the S. side the summit of the Col de Crête Sèche, added to his numerous other exploits in this district the ascent of the Mont Gelé, believed to have been previously untouched; and an adventurous mountaineer may take that peak in his way from Chermontane to Oyace or Biona, though the ascent is practicable only on the S. side.

At Chermontane are some chalets called Chaurion, lying a little higher up, and nearer the Otemma Glacier than the main group, but they appear to be but seldom inhabited, even during summer.

1. *By the Col de Crête Sèche.* The lower part of the Otemma Glacier is easily accessible from Chermontane, but before long it becomes so much crevassed as to be impassable, except on the S. side, where it abuts against the precipitous rocks of a great buttress of Mont Gelé. Here the ascent becomes rather intricate for about $\frac{1}{2}$ hr., and above the more shattered region the glacier is traversed by long transverse crevasses, whose width doubtless varies with the season, but is sometimes inconvenient to the traveller. After passing the base of the Mont Gelé the lateral glacier descending from the Crête Sèche comes into view. From the slight notice of a single traveller who passed the col it would appear that it presents no great difficulty. The summit is 9,475 ft. in height, and formed of broad slabs of rock. 'It is well defined as a col, for to the W. runs up a ridge of serrated rocks towards the snow-slopes of Mont Gelé, whilst to the E. a shorter chain ends in a snow-slope of the Trouma des Boucs. From the traveller's feet, northwards, descends the *Glacier de Crête Sèche*, bordered on the

E. by the Trouma des Boucs, and on the W. by the Pointe d'Ayas, a crest of black rock, apparently connected with the Gelé by an impassable arête. Below the bounding ranges the glacier runs into the magnificent Glacier of Chermontane.'—[F. W. J.]

On the S. side of the col is a slope of névé, followed by moderately steep rocks alternating with beds of snow. In descending the traveller has a very fine view of the Graian Alps, and more to the l. stands Mont Faroma, one of the chief summits of the range separating the Val Pellina from the Val de St. Barthelemi. The remains of a hut, formerly used by the 'préposés' set to watch smugglers at this entrance into Italy, are seen about $\frac{1}{4}$ hr. below the base of the lowest snow-slope. The middle and lower slopes are covered with blocks of stone, supposed to have been left by a glacier which formerly descended from the pass. The path descends into the valley about 1 m. above Oyace, reached in 6 hrs. from Chermontane; 3 hrs. sufficing for the ascent if the snow be in good order, and 3 hrs. more for the descent. Prarayan is $4\frac{3}{4}$ hrs. from Oyace. (See Rte. G.)

2. *By the Mont Gelé.* The Mont Gelé, when seen from the Col de Fenêtre or the Glacier d'Otemma, attracts attention by the extreme steepness of the precipices which guard it to the N. and W. The summit is a ridge consisting of three peaks, of which the central one is the highest. The latter appears to be accessible only from the *Glacier de la Balme*, which descends to the SW. in the direction of Ollomont, and is most conveniently reached from the S. side of the Col de Fenêtre. This must therefore be crossed by a traveller who would take the Mont Gelé in his way from Chermontane to the Val Pellina. A rough ascent, commencing some distance above the lake (Rte. D), leads from the path of the Col de Fenêtre to the Glacier de la Balme. Long climbing, chiefly over snow-slopes, leads to the upper part of

the peak, where nothing but a single wide crevasse, or bergschrund, bars access to the central and highest summit. When a snow-bridge has been found across this defence the peak is soon won. It consists of a small dome of ice-coated snow, wreathed up by the wind into a cornice. Twenty feet below the top, on its E. side, are some rocks overhanging an apparently impracticable ice-couloir, which separates the highest from the second peak. In the opposite direction stands the third summit, that nearest to the Col de Fenêtre. The view, as may be supposed, from the central position of the mountain, is extremely grand.

‘Creeping cautiously to the edge of the rocks they will be found to be an absolute precipice overhanging the head of the Glacier de Crête Sèche, beyond which stretches up to the NE. the superb glacier of Chermontane. Beyond this again is the Mont Collon; and it is seen that no such barrier as the Crête de Collon exists.’—[F. W. J.]

Mr. Jacomb reached the summit by a somewhat circuitous way from the Col de Crête Sèche, and the same way must be taken by a traveller desiring to descend to Oyace or Biona. To effect this, the traveller, after recrossing the bergschrund, must bear to the eastward and round the base of the second or E. peak of the Gelé, descending as little as possible until he has left that behind him. He then reaches a point on the upper edge of the névé of La Balme which is connected with the Col de Crête Sèche by a jagged ridge of rocks, and it is possible to descend along the N. side of this ridge; but this involves so much loss of time that Mr. Jacomb recommends travellers to descend to the upper basin of the *Glacier de Crête Sèche*, cross its head, and then reascending gain the level of the col. Until the contrary shall be proved, it appears probable that a direct descent to Oyace may be found from the eastern side of the névé of la Balme, without making the detour by the Glacier de Crête Sèche.

3. *By the Col de la Reuse de l'Arolla.*

The upper part of the Otemma Glacier, E. of the supposed Crête à Collon, receives a tributary which descends along the S. side of a rocky ridge apparently connected with the Mont Collon. This leads to a pass discovered in 1861 by Mr. Tuckett, accompanied by two friends, and the well-known guides Bennen and Perrn, which has received its name from the glacier that on the S. side connects it with the Combe d'Oren. This affords the most direct rte. from Chermontane to Prarayen, being easily effected in 7 hrs. exclusive of halts, if the snow be in good order.

It has already been mentioned that the only practicable way over the crevassed portion of the Glacier d'Otemma lying between the Mont Gelé and the Pic d'Otemma is along the S. side. Another way to overcome the difficulty is to keep at first to the N. side of the glacier, and, as soon as it becomes too much crevassed, to continue the ascent by the steep rocks on the rt. bank, at the SW. base of the Pic d'Otemma. Mr. Tuckett seems to have encountered some difficulties amongst the *séracs* at the place where it is necessary to regain the ice, even so early as the 26th June, when he made this passage. It seems probable that at a later season these difficulties would be more serious, and that as a general rule it is better to keep to the opposite side. When the lower crevassed region has been passed, the way lies clear and open before the traveller. The glacier mounts with a gentle slope for several miles without the slightest break, its main stream bending to the NE., while right ahead are seen the rocks lying N. of the Col de la Reuse de l'Arolla. The judicious mountaineer will not, however, lay aside the rope so long as his way lies over the névé. The lateral glacier mounting towards the pass is rather steeper than the main stream, but the only difficulty lies in a large bergschrund, over which Mr. Tuckett and his party sought for some time before finding a snow-bridge. A steep slope requiring the

use of the axe leads up from thence to the Col, whose height, estimated from an imperfect observation, is about 10,400 ft. The descent commences by a steep ridge of rocks, partially coated with snow, and requiring some care, which leads down to the upper plateau of the *Reuse de l'Arolla* (Ruize or Reuse being a local word for glacier). Below the gently sloping upper plateau, the Reuse de l'Arolla forms a great ice-fall overhanging the Combe d'Oren. This appears quite impassable, but the rocks on its E. side, though steep, present no serious difficulty, and in less than an hour they lead down to the moraine of the lower part of the glacier which approaches near to the track leading from the Col de Collon (§ 19, Rte. A) to *Prarayen*.

ROUTE L.

CHERMONTANE TO EVOLENA, BY THE COL DE CHERMONTANE.

For all practical purposes this pass was not discovered until the 16th of August, 1861, when it was traversed by Sir T. F. Buxton, Mr. J. J. Cowell, and Mr. E. Buxton, with Michel Payot of Chamouni as leader, and by Justin and Louis Felley of Lourtier as porters. Of the last, who made several glacier passes in the same company, a very favourable report is given in the account of the expedition contained in 'Peaks Passes, and Glaciers.' There is little doubt, however, that the pass had been made before that date. In September 1853, the editor was informed by the younger Pralong, and another herdsman at the Châlets d'Arolla, that a stranger had mounted along with two men of the valley by one of the neighbouring glaciers (Gl. de Pièce?), had passed over a glacier that reached to the Val de Bagnes, and that there is a pass (Col de Crête Sèche?) leading from the same glacier to the Val Pellina. No further particulars were obtained.

The way is for a considerable dis-

tance nearly the same as that to the Col de la Reuse de l'Arolla (see last Rte.), except that on gaining the upper level it is better to keep nearer to the N. bank of the glacier. The summit is a vast field of névé, lying between the Pigne d'Arolla and the Mont Collon, so level that it is not easy to determine the exact watershed, and probably about 10,200 ft. in height. The direct line from the summit of the pass would lie down the *Glacier de Vuibez* which joins the main stream of the Gl. de l'Arolla at the NW. base of the Mont Collon. This glacier forms two formidable ice-falls, divided by a central mass of rock. The northern of these may not be quite impassable, but must always be very difficult and dangerous. It is not surprising that the explorers of the pass, after forcing their way down for some distance, should have abandoned the attempt, and returning nearly to the level of the plateau aimed at a gap in the ridge of rocks (Serra de Vuibez of Studer's map) that shut in on the N. side the head of the Vuibez Glacier. A short but steep ascent leads to this, which must be considered the true summit of the pass; by Mr. E. Buxton's observation it is 10,349 ft. in height. It may be reached in about 6 hrs., exclusive of halts; from Chermontane, or $\frac{3}{4}$ hr. from the summit of the plateau, and commands a noble view extending through the openings between the surrounding peaks to many distant Alpine summits. Immediately to the N. descends the *Glacier de Pièce* over which lies the descent to the Combe de l'Arolla. This is far from easy; the western side appears the least difficult, but several awkward places were passed, and, although running or glissading wherever possible, $1\frac{1}{2}$ hr. was employed in reaching the W. moraine, which Mr. Cowell describes as the most gigantic that he has seen, requiring $\frac{1}{2}$ hr. for its descent. The head of the Combe de l'Arolla seems to present vast remains of the working of former glaciers, six great moraines being here seen to lie side by side.

The well-marked *dirt bands* of the Arolla Glacier have attracted the attention of several travellers. According to Sir T. F. Buxton, they are confined to the portion of the lower glacier that originates in the Vuibez ice-falls.

Having crossed two other moraines, the party traversed the lower end of the *Glacier de Cijorénove*—Otemma Glacier of Studer's map—which bends round to the N.E. so as nearly to meet the *Glacier de Pièce*. Three further moraines, indicating the former limits of the first-named glacier, are also to be passed before the traveller enters the *Combe de l'Arolla* near to the highest châteaux, about 9 hrs. from Chermontane. The comfortable inn at Evolena (§ 19, Rte. A) is reached from hence in $3\frac{1}{2}$ hrs.' steady walking; but if the traveller intends crossing the Col de Collon, or attempting the route to Zermatt by the Col de Zardezan (Rte. 9), he may find tolerable accommodation in some of the neighbouring châteaux.

ROUTE M.

CHERMONTANE TO EVOLENA, OR HÉRÉMENCE, BY THE COL DU MONT ROUGE.

This pass, known to some of the hunters of Bagnes, but very rarely used, is described by Professor Ulrich in his '*Seitenthäler des Wallis*, and by Mr. W. Mathews in the first series of '*Peaks, Passes, and Glaciers*.' It is a longer and more laborious way to Evolena than that described in the last Rte., but would be the best for a traveller who would explore the upper end of the little-known Val d'Héremence.

Descending from the Châteaux de Chermontane to the *Glacier du Mont Durand*, the traveller at once quits the track which leads down the Val de Bagnes (Rte. D), and bearing to the right, across the end of the glacier, gains the rt. bank of the Dranse.

The lower part of the *Glacier de Breney* being steep and crevassed, it is necessary to climb the rocks on its S. bank until a point is reached from whence it may be conveniently attacked. In 1856, when Messrs. W. and C. E. Mathews took this route, they found that the glacier de Breney showed signs of rapid retreat, while at the same time the neighbouring glaciers of Otemma and Mont Durand were evidently advancing, and had ploughed up the soil in front of the ice. They also found a series of wide longitudinal crevasses, which greatly increased the labour of traversing the Breney Glacier. The main stream of this glacier descends from a reservoir of névé between the Pigned'Arolla, the Mont Blanc de Cheillon, and the nameless peaks that separate this from the head of the Otemma Glacier. It receives from the N.E. an affluent descending from the *Rouinette* (12,727'), a peak which, on the opposite or W. side, supports the small glacier of *Lire Rouge*. To reach the Col du Mont Rouge it is necessary, after gaining the N. bank of the *Glacier de Breney*, to cross the névé of the *Lire Rouge*, without approaching too near to the *Rouinette*, which sends down frequent avalanches. Mr. Mathews and his party found this small glacier very troublesome, from the great number of concealed crevasses. A col, commanding a very fine view to the W. and S., separates the névé of the *Glacier de Lire Rouge* from that of the *Glacier de Gétroz*. According to the Federal Map, this first pass is the *Col du Mont Rouge*, 10,958 ft. in height. It is here seen how extensive an upper reservoir of névé is drained by the comparatively small ice-fall which is all that is seen of the latter glacier from the Val de Bagnes. The upper basin now traversed is a nearly level snow-field lying W. of the *Rouinette* (12,727') and the *Mont Blanc de Cheillon* (12,700'), apparently the highest summits of the mountain region lying between the Grand Combin and the Dent Blanche.

On the E. side of the snow-field the

traveller reaches a second col, 10,663 ft. in height, forming the watershed between the Val de Bagnes and the Val d'Hérémence. There has been much confusion as to the name of the considerable glacier which descends on the opposite side, first NE. then nearly due N. towards the head of the Val d'Hérémence. It has appeared in the earlier maps under the names Durand, Liapey, and Lenaret, and in the Federal map under that of *Glacier de Cheillon*. It is apparently known in the Val de Bagnes as *Glacier d'Hérémence* — an appropriate name, since it closes the head of that valley. No account of the descent on the Hérémence side has reached the editor. The track indicated in Studer's map is carried along the l. bank, and not over the glacier. (See § 19, Rte. C.) The distance from the foot of the glacier to the village of Hérémence is counted as 6 hrs. The Messrs. Mathews, guided by Bernard Trolliet, passed round the NW. side of the peak of Mont Blanc de Cheillon to reach a gap in the ridge connecting that mountain and the Pigne d'Arolla with the *Pic de Vouasson* (11,476'), and dividing the head of the Val d'Hérémence from the Combe de l'Arolla. This gap is apparently the *Pas de Chèvre* of Studer's map, and is reached by an extremely narrow ledge of rock. 'This looked so ugly that we preferred keeping to the right, and crossing the ridge at a higher level. We got easily down to the other side. . . . We now found ourselves at the head of a desolate valley communicating with the Combe de l'Arolla, savage with piles of broken rock, and ghastly stems of scorched and withered pine.'—[W. M.] The descent lies not far from the W. bank of the *Glacier de Cijorénove*, and leads down to the upper châteaux of the Combe de l'Arolla, nearly at the same point as in the last Rte. To reach these châteaux from Chermontane, Mr. Mathews employed 11 hrs., of which but a short time was given to rest, so that this pass may be counted as longer by 1 hr. or $1\frac{1}{2}$ hr. than that described in the last Rte.

SECTION 19.

EVOLENA DISTRICT.

THE principal valleys through which the drainage of the central portion of the Pennine Alps is borne down to the Rhone present some striking points of agreement. In ascending the valleys of Hérens or Anniviers described in the present section, or that of Visp (§ 20), the traveller finds, after a few miles, that the main stream is formed by the union of two torrents originating in two nearly parallel glens, and uniting at the base of the mountain ridge which had previously divided them. Something of the same arrangement is seen in the valley of the Dranse (§ 18), but the bounding ranges do not follow so closely the meridional direction as in those just mentioned. Alternating with the gorges through which the Borgne, the Navisanche, and the Vispach flow into the Rhone valley, the much shorter valleys of Nendaz, Reschy, Turtman, and Gamsen, drain the N. part of the intervening mountain ranges.

The two principal valleys here included, the Val d'Hérens (Germ. *Eringer Thal*), and the Val d'Anniviers (Germ. *Einfisch Thal*), were until lately amongst the least known in the Swiss Alps, mainly because of an exaggerated impression that the inhabitants were a rude and semi-barbarous race, and that a traveller must there encounter an unusual share of filth and privation. Upon seemingly slender grounds, some Swiss and German writers attributed to the people a foreign extraction (Scandinavian or Cimbric), and made these valleys the seat of peculiar legends which are common to a large portion of the Swiss Alps. In a first visit made by the writer in 1845 he found little or nothing in the language or appearance of the people of Val d'Anniviers to distinguish them from those of the valley of the Dranse, save what might be

attributed to the rarity of their intercourse with strangers. They appeared very industrious and hospitably inclined, but extremely dirty in their habits. The necessities of their position lead them to live a partly nomadic life. The same family possessing some patches of arable land in the lower part of the valley, some pastures and meadows higher up, and a cattle alp on the upper slopes of the mountains, with perhaps a patch of vineyard in the valley of the Rhone, and each place being several hours' walk distant from the other, they are led to change their dwellings several times in the year. Hence it is not uncommon to find large groups of houses called *mayens*, approaching the dimensions of a village, without a single inhabitant; the place being used only for some weeks in the early summer, and again in the autumn, during the passage of the cattle between their winter quarters in the lower valley and the upper pastures. In point of scenery, these valleys, and especially the Val d'Anniviers, scarcely yield to any in the Swiss Alps, unless it be the neighbouring valleys of Zermatt and Saas. The opening of a good inn at Evolena, and of tolerable ones at Zinal and St. Luc, have done much to make this district accessible to strangers. The glacier passes leading out of them are full of interest to the mountaineer, but are all of them somewhat laborious, and scarcely to be recommended to ladies or to unpractised pedestrians. Those connecting the Val d'Hérens with Chermontane have been described in the last section (Rtes. L and M). The main branch of that valley penetrates somewhat farther S. than the Val d'Héremence or the Val d'Anniviers, and is the only one which attains the dividing ridge, giving direct access to Piedmont. The head of the Val d'Anniviers is cut off from the great snow-fields between the Dent Blanche and the Dent d'Hérens (whence the Ferpèche Glacier descends towards Evolena, the Zmutt Glacier towards Zermatt, and the Zar-

dezan Glacier to the Val Pellina) by a very lofty ridge connecting the Dent Blanche with the Gabelhorn.

It seems most convenient to fix as the eastern limit of this district the range separating the waters of the Visp from the Eufisch Thal and the Turtman Thal, including the Gabelhorn, the Weisshorn (14,804'), and the lower range extending thence to the Augstbordhorn (9,785'). To the S. it extends by the passes of the Col de Collon and the Col des Bouquetins to the head of the Val Pellina.

ROUTE A.

SION TO AOSTA, BY THE VAL D'HÉRENS
AND COL DE COLLON.

	Hrs. walking	Eng. miles
Mage	2	5½
St. Martin	1¼	3½
Evolena	2½	7
Châlets d'Arolla	3½	9
Prarayen	6	12
Biona	3½	10½
Aosta	5½	16½
	24½	64½

There is a good mule-path from Sion to Evolena, and from Prarayen to Aosta. It is possible to make this route in two days, sleeping on the first night at the Châlets d'Arolla; but it is a very long day's walk from thence to Aosta. Some persons have preferred to go in one day from Evolena to Biona, but a stranger arriving at the latter village in the evening is liable to find the *curé* absent, and the other inhabitants unwilling to admit him. It is a better plan to sleep at Evolena and at Prarayen, thus dividing the journey into three easy days.

After crossing the bridge over the Rhone at Sion (§ 21, Rte. A), the road to the l. hand leads to the narrow opening through which the *Borgne* issues from the *Val d'Hérens* (Germ. Eringer Thal). The torrent is crossed close to *Bramois*, ½ hr. from Sion, where there is a foundry. Here the ascent commences rather steeply. On the l. hand, at some distance above the track, is a

curious hermitage, called *Longeborgne*, inhabited by two monks. The whole building, including the church and the altar, are hewn out of the live rock. The track continues at a great height above the gorge of the Borgne to Mage. From hence an ascent of 3 hrs., due E., leads to the summit of the *Mont Noble* (8,776'). said to command a fine panoramic view of the Bernese and neighbouring Pennine Alps.

Several villages and hamlets are crowded into this part of the valley. Opposite *Suen* is the opening of the Val d'Hérémence, and a little above, in the main valley, but on the l. bank, is *Useigne*, near to which are some remarkable pinnacles, or columns of earth, each capped by a boulder of rock, which has protected the shaft from erosion by rain. To visit these, it is better to follow the path from Sion to Hérémence (Rte. C), whence, crossing the gorge of the Dixence by a very picturesque bridge, the traveller may soon reach Useigne, visit the earth pinnacles, and continue his rte. to Evolena by a rough path along the l. bank.

Above St. Martin, the mule-track is less steep. It is carried along the E. side of the valley, in part through pine forest, till it reaches the rt. bank of the Borgne, which it follows for some distance, gaining occasional views of the snowy peaks to the S., until a further ascent leads to

Evolena, the chief village of the valley (4,521'), where a good inn has lately been opened, very favourably reported of by travellers. The only complaint made is, that the landlord is inclined to recommend his own relatives, though young and inexperienced, for difficult mountain excursions. The people of this valley are said to have a full share of the national keenness in the pursuit of gain, and many complaints have been made of the exorbitant demands made upon travellers by guides, &c. It may therefore be an improvement that a regular tariff should have been established. The following charges are fixed:—

	fr.	c.
Ordinary day's pay for a porter . . .	5	0
„ for a guide merely showing the way . . .	4	50
„ for bearing a chaise à porteur . . .	6	0
„ for porters or guides resting or returning home . . .	4	0
Guide to Ferpècle Glacier . . .	3	0
„ to Glacier de Vouasson . . .	3	0
„ to Couronne de Bréona . . .	5	0
„ to the Sasseneire . . .	6	0
„ to Trois Dents de Visivi . . .	7	0
„ to Glacier de l'Arolla . . .	5	0
„ to Cascade des Igaoz . . .	4	0
„ to Aiguille de la Za . . .	6	0
„ over Col de Torrent . . .	5	0
„ to Vissoie . . .	10	0
„ to the Bella Tola . . .	18	0

The following are also enumerated, with the proviso that two guides must be taken by each traveller; but the editor has not learned that any men from Evolena have accomplished the three last in the list, as to which the tariff adds that, besides the guides, porters must be engaged:

	fr.
Over Col de Collen to Biona . . .	20
„ Col d'Hérens to Zermatt . . .	20
„ Col du Mont Rouge to Chermontane . . .	18
„ do. if taken on to Ollomont . . .	22
Ascent of Mont Collon . . .	30
„ of Pigne d'Arolla . . .	30
„ of Dent Blanche . . .	50

Excepting the last, these charges are fair enough, but travellers should vehemently resist the uniform rule requiring two guides to be taken for each stranger. Practised mountaineers are usually able to take their fair share of the labour of an ascent, and many Englishmen are better able to find the way over a glacier than the men of this valley. Inexperienced travellers, who do require a good deal of assistance, will do well to secure the companionship of some tried and well-known guides before attempting the peaks and passes of this district.

The situation of Evolena is not to be compared with that of Zermatt, Chamouni, Courmayeur, or several other centres of mountaineering interest; but in the excursions for which it forms the most convenient headquarters, it is little inferior to any of those places. From hence radiate six first-rate glacier passes, noticed in the

last or the present section, besides which the numerous excursions included in the above tariff afford a tempting bill of fare to the mountaineer.

Of the neighbouring summits, the *Sasseneire* (10,692'), and the *Couronne de Bréona* (10,382'), offer the finest views. The former, lying N. of the Col de Torrent, is steep towards the summit, and requires a stiff climb. The second, easier of access, commands a view less panoramic, but nearer to the great peaks of the Dent Blanche and the Dent d'Hérens. For a view of varied glacier scenery, that from the *Aiguille de la Za* (12,051') is, perhaps, superior to either. On the one side it overlooks the vast glaciers of Ferpèche and Mont Miné, and on the other those of Arolla, Vuibez, Pièce, and Cijorénove, backed by the Mont Collon. From the slope of the mountain above *Haudères*, within 1 hr. of the village, there is a fine view of the Ferpèche Glacier and the Dent Blanche, which will well reward an afternoon stroll.

In going from Evolena to the Arolla Glacier, the guides sometimes take a very rough path along the l. bank of the Borgne, but it is much better to follow the rt. bank to *Haudères*, a poor hamlet nearly 1 hr. above the village. Here the stream from the great glacier of Ferpèche descends from the SE. to join the main branch of the Borgne, originating in the Glacier de l'Arolla. The upper end of the Val d'Hérens, above *Haudères*, is called *Combe de l'Arolla*, arolla being the local name for the *Pinus Cembra*, which is common in this part of the Pennine chain. This is a narrow glen, lying between a rugged chain of lofty peaks, sometimes collectively called Les Grandes Dents, enclosing it on the E. side, and the rather less formidable range which separates it from the head of the Val d'Hérenmence. The range of the Grandes Dents extends about due S. from the *Dent de Visivi* through the *Aiguille de la Za*, and many intermediate peaks, to the summits known as the *Dents de*

Bertol, or *Dents des Bouquetins* (§ 18, Rte. G). A little above *Haudères* the path, after crossing the Ferpèche torrent, passes to the l. bank of the Borgne, and advances through the *Combe*, amid scenery constantly increasing in wild and savage grandeur. Nearly 1 hr. above *Haudères* is the Chapel of St. Barthelemi, and a little higher up on the rt. the fine *Cascade des Ignos*, 500 ft. in height. The last hamlet, consisting of *mayens*, is called *Montà*. Above this several châteaux are perched here and there on the steep slopes of the valley. The highest are within $\frac{1}{2}$ hr. of the foot of the glacier, and from thence, mounting to the rt., is the way to the Col de Chermontane (§ 18, Rte. L).

The ascent to the Col de Collon from the N. side is not surpassed by many similar scenes in the Alps. The *Glacier de l'Arolla* makes two considerable bends in opposite directions (the first being convex to the W.) so as to approach the form of the letter S. Round the first or lower curve it descends in a great ice-fall from the SE., while at the same part of its course it receives from the SW. the *Glacier de Vuibez*, forming a still grander ice-cascade, broken in the middle by an island of rock (see § 18, Rte. L). The lower part of the united glacier is easily traversed, but on approaching the ice-fall it is necessary to take to the rocks on the E. bank. These are climbed by a stiff scramble, requiring some caution, especially after fresh snow. After gaining some height above the ice-fall, the traveller returns to the glacier, where the crevasses are no longer formidable, and, taking a nearly S. direction, cuts off the eastern curve of the upper glacier. The *Mont Collon* (12,264'), rising in the fork between the Arolla and Vuibez glaciers, is here a very grand object, rising almost vertically from the edge of the glacier. The echo returned from its steep face has served to guide travellers surrounded by clouds, and uncertain as to their course. The pass

is, however, one of those which should not be attempted in doubtful weather. The traveller's guide, if a native of the Val d'Hérens, will not fail to tell the story of a party of villagers from Evolena overtaken by a snow-storm on this part of the glacier, and attempting to return after failing to find the pass, when three of them perished in the snow. Professor Forbes and his guide found one of the bodies in 1841. On the same part of the glacier the writer observed the fresh tracks of several wolves, apparently following those of some chamois. From this part of the glacier a wide opening to the l. shows an extensive field of *névé* mounting gently to the SW. towards an opening in the ridge to the N. of the *Poïnte de Zardezan*. This corresponds to a similar opening connected with the upper *névé* of the *Zardezan Glacier*, and forming the *Col de Zardezan* (§ 18, Rte. G). By combining this with the *Col de la Val Pellina*, a traveller may reach Zermatt from the *Châlets d'Arolla* in 12 or 13 hrs. Gradually ascending over the *névé* SE. of the peak of *Mont Collon*, the traveller, in about 4 hrs. from the *Châlets d'Arolla*, reaches the summit of the *Col de Collon* (10,269'), marked by a small iron cross, dated 1754, stuck into a cleft of rock on the rt. The summit commands a wild scene of rock and snow-field, but no distant view. It overlooks the head of a glacier, much less considerable than that of *Arolla*, which descends SW. into the *Combe d'Oren*, a wild dreary glen connected with the head of the *Val Pellina*. The descent on the SW. side is much easier than the ascent, the glacier being less crevassed. It is sometimes possible to descend the whole way by the ice, taking due heed of concealed crevasses; but it is a surer course to cross diagonally the head of the glacier, and descend by the rocks on its SE. bank; they are pretty steep, but quite free from difficulty. On reaching the valley below, whence the glacier appears to have retreated not long ago, the

traveller may observe on the rt. the small glacier of *La Reuse de l'Arolla*, by which lies the way to *Chermontane*, described in § 18, Rte. K. The *Combe d'Oren* opens into the *Val Pellina* just below the principal *châlets* of *Prarayan*, whence *Biona* may be reached in 3 hrs., fast walking. (See § 18, Rte. G.)

When the snow is in good order, 6 hrs., exclusive of halts, suffice for the pass between the *Arolla Châlets* and those of *Prarayan*; but, under unfavourable conditions, an hr. or two more may be necessary, or a still longer time, if the true way over the *Arolla Glacier* should be missed.

ROUTE B.

EVOLENA TO PRARAYEN BY THE COL DES BOUQUETINS.

The existence of a pass leading direct from the lower end of the *Ferpèche Glacier* near Evolena to the head of the *Val Pellina*, has long been affirmed, and such a pass is indicated on the Government map of *Piedmont*, utterly incorrect as it is in regard to this part of the *Pennine range*. The same pass is again indicated on the *Swiss Federal map* by a dotted line, not carried down to the base of the glaciers on either side, with the name *Col des Bouquetins*. The only authentic information respecting it that has reached the editor is from *Mr. W. E. Hall*, who, with *Mr. Digby*, made the passage in 1862. The route taken by those gentlemen was in great part a combination of those of the *Col d'Érin* (Rte. D), and the *Col de la Val Pellina* (§ 18, Rte. G).

Keeping by the W. side of the *Ferpèche Glacier* to the part where the rocks begin to be mixed with ice and snow-slopes, they ascended these rocks, composed of red granite, steep, but affording good hold for feet and hands. These lead up to a snow-plateau lying on the W. side of the

Tête Blanche, and falling away by a gentle declivity to the actual col, which is about where indicated by the Federal map. The height of this has been determined by the Swiss engineers, probably by levelling, at 11,214 ft.; but the plateau near the base of the Tête Blanche, which must be traversed, is the true summit of the pass. This is about 200 ft. higher, or 11,414 ft. above the sea, being about the level of the Col d'Hérens. Crossing the plateau about due S., and descending over débris at the base of the Tête Blanche, they joined the route of the Col de la Val Pellina, near the summit of the rocks overlooking the lower level of the Zardezan Glacier.

The col, as laid down by the Swiss engineers, would connect the head of the *Glacier de Mont Miné* with the NW. part of the névé of the Glacier de Zardezan. The former may be considered as part of the great Ferpèche Glacier, raised upon a terrace of rock to a higher level, until the two ice-streams finally unite a short way above the lower end of their course. Mr. Hall thinks it probable that the ascent 'might be made by the Glacier de Mont Miné, though the passage of the séracs would certainly take a very long time,' and in that case a traveller would reach the col indicated on the Federal map. But if he were to attempt to descend on the S. side in the direction indicated by the dotted line on that map, he would find before him a perpendicular cliff of ice, and would finally be forced to ascend to the plateau at the base of the Tête Blanche, as above pointed out.

ROUTE C.

SION TO THE VAL DE BAGNES, BY THE VAL D'HÉRÉMENCE.

To judge from the absence of information, the *Val d'Hérémence* is the

only one of the upland valleys of the Pennine Alps which has failed to attract the notice of the members of the Alpine Club. From the scanty materials available, chiefly derived from Berlepsch, several routes are here indicated, in the hope of directing further attention to a little-known district.

After crossing the bridge over the Rhone at Sion a mule-track mounts a little E. of S., and then winds round the slope of the mountain at a great height above the gorge of the Borgne, gaining in $1\frac{1}{2}$ hr. the village of *Vex* or *Vesch*. On the opposite bank of the Borgne is seen the hermitage of Longeborgne and the village of *Nax*. Of the three paths that lead from Vex the uppermost is chosen. Following this due S., the traveller in 1 hr. more reaches

Hérémence, a village commanding a fine view of the main Val d'Hérens, with the peak of the Dent d'Hérens in the background, and overlooking the junction of the *Dixence* with the Borgne. The former stream, rising in the Glacier de Cheillon, flows through the *Val d'Hérémence*, also called Val d'Orchéra. Descending to the bridge over the Dixence the traveller may reach Useigne and visit the remarkable earth pillars near it (Rte. A). The mule-path up the valley keeps to the l. bank of the Dixence, and in 1 hr. farther reaches *Marche*, near which is a curious cave—*Caverne d'Arzinol*—said to bear traces of having served as a dwelling for some primitive inhabitants of the valley. 2 hrs. farther are the *Mayens de Pralong* on the rt. bank of the stream, from whence the traveller may reach Evolena by the *Pas d'Arzinol* in 5 hrs. The *Châlets de Méribé* lie 1 hr. farther up. These are connected with Evolena by the *Col de la Maigne*, lying between the *Pic d'Arzinol* and *Pic de Vousson* (11,476').

From Méribé a steep ascent leads to the upper level of the Val d'Hérémence. More than an hour is required to reach the châteaux of *La Barma*, whence lies a

pass to Lourtier by the *Col de Séveren* (apparently the *Col du Cret* of the Federal map), as to which the editor has received no information. Several groups of châteaux lie higher up towards the head of the valley. Those of *Liapey* are near the lower end of the *Glacier de Lenaret* (*Glacier de Liapey* of Studer's map) descending from the N. side of the *Mont Pleureur*. A pass might possibly be made in that direction to the *Pont de Mauvoisin* in the *Val de Bagnes* (§ 18, Rte. D), but the descent on the W. side would probably present some difficulty. About $1\frac{1}{2}$ hr. above *La Barma*, or $6\frac{1}{2}$ hrs. from *Hérémence*, the valley is closed by the *Glacier de Cheillon*, over which lies the *Col du Mont Rouge* (§ 18, Rte. M), but no information as to the ascent to the col from this side has been obtained. A traveller desiring to pass from the head of this valley to the *Combe de l'Arolla* may mount along the W. side of the *Glacier de Cheillon* to the *Col de Riedmatten* (9,354'), said to command a very fine view of the head of that wild Alpine glen. The descent on the Arolla side is easy. *Oxytropis fatida*, *Carex microglochin*, and *Agrostis purpurea* have been found in this valley.

The ascent of the *Mont Blanc de Cheillon* (12,700') might best be attempted from some of the châteaux at the upper end of the *Val d'Hérémence*. It does not appear to have yet attracted the attention of mountaineers.

ROUTE D.

EVOLENA TO ZERMATT, BY THE COL D'HÉRENS—ASCENT OF THE DENT BLANCHE.

This pass, commonly written *Col d'Érin*, was first made known to Alpine travellers by Professor Forbes. Of late it has been so frequently traversed that it is now well known to the Zermatt guides. These charge 30 fr., and a single guide makes no objection to go

with a practised mountaineer, returning alone. The Evolena tariff is now fixed (?) at 20 fr., but requires that each traveller should take two guides. In the case of a single traveller this is not unreasonable, because it is impossible for a single man to return over the pass without risk; but in the case of two or more travellers used to glacier expeditions, there is not the least necessity for increasing the number of guides beyond that of the travellers.

The owner of the *Châlet de Bricolla* has fitted up two small rooms with two beds in each for the accommodation of travellers, and there is an obvious advantage in making that place the starting-point for the pass; but the charges are said to surpass that reasonable degree of dearness that may be expected in such a situation. In the general interest, it is desirable to resist extortion, and some travellers have no objection to start from Evolena as early as 2 A.M., thus leaving sufficient time for the pass, even if the snow should happen to be in bad order. It is hard to calculate the time required, as the crevasses on the Zmutt side are sometimes very troublesome, and at others present little difficulty. Some travellers have passed from Evolena to Zermatt in 11 hrs.' actual walking, but many others have employed 13 or even 14 hrs., exclusive of halts.

At the hamlet of *Haudères*, nearly 1 hr. above Evolena, is the opening of the lateral valley through which the torrent from the *Ferpèche Glacier* descends from the SE. to join the *Borgne*. A path rises along the NE. side of the valley, and in about an hour reaches a point where it overlooks the lower end of the glacier. The *Glacier de Ferpèche*, with its affluent the *Glacier de Mont Miné*, is the NW. outlet of one of the most extensive snow-fields in the Alps. The general form is that of an elbow, being defined by two sets of nearly parallel ridges, which include several peaks of the first order. To the S. and W. is a ridge, which, passing through the *Dent d'Hérens* (13,714'), extends

about due W. from the Matterhorn (14,705') to the *Dents de Bertol* (12,412'), and then NNW. through the *Dora Blanche* (11,668') and the *Aiguille de la Za* to the *Dents de Visivi* (9,506'). Parallel to this, and about 5 m. distant to the N. and E. is the ridge running W. from the Gabelhorn (13,363') to the Dent Blanche (14,318'), and thence NNW. through the *Grand Cornier* (13,022') to the *Couronne de Bréona* (10,382'). The space included between these ridges is divided transversely by a ridge averaging nearly 12,000 ft. in height, connecting the Dent Blanche with the Dent d'Hérens, which rises about half-way into the snow pyramid of the Tête Blanche (12,304'), the central point of this icy region. A part of the plateau being higher than the ridge between the Dent d'Hérens and the Dents de Bertol, the surplus névé is poured down to the S., forming the ice-fall of the Glacier de Zardezan (§ 18, Rte. G.). A ridge extending from the Tête Blanche parallel to the direction of the Glacier de Ferpècle divides it from the parallel Glacier de Mont Miné.

The track to the Col d'Hérens, after passing several châteaux, ascends rapidly to those of *Bricolla*, several hundred ft. above the rt. bank of the glacier, $3\frac{3}{4}$ hrs. from Evolena. The view is worth the walk from Evolena for those who do not intend crossing the pass. From the châteaux a faintly-marked track mounts along the rt. bank, chiefly by the lateral moraine, till in 50 min. it becomes necessary to take to the ice opposite to an island of rock rising in the middle of the glacier called *Motta Rotta*. Behind the latter is the snow summit of the Tête Blanche, connected with the Dent Blanche by a ridge called the *Wandfluh*, on this side covered with snow, but on the other showing a precipitous face of bare rock. The pass lies over the lowest part of this ridge a short way NE. of the Tête Blanche. The exact course to be taken across the glacier varies with the season, but, in general, the best way lies about

mid-way between the *Motta Rotta* and the *Wandfluh*. When the upper névé is reached the ascent to the summit is easy, unless there should be fresh snow in the way. Some grand objects are visible from the col, of which the Matterhorn is preeminent; but, in spite of its great height (11,418 ft.), it does not command a very wide circuit. To see the Monte Rosa chain it is necessary to ascend a short distance to the l. to an eminence in the ridge of the *Wandfluh* (the *Stockhorn* of Professor Forbes) about 350 ft. above the actual col, or, if time allows, it is better still to ascend the *Tête Blanche*. (See § 18, Rte. G.) The descent on the E. side of the col is usually much more difficult than the ascent. As already mentioned, the *Wandfluh* shows a bold front of rock on its E. side, and is in great part guarded at the base by a wide *bergschrund*. This wall is lowest and least difficult near the col, where it is reduced to a steep slope of about 100 ft., partly coated with snow. Caution is required for the descent, which lands the traveller on the upper basin of the *Zmutt Glacier*. This is much crevassed, and a good deal of time is consumed in reaching a projecting point of rock which is the top of the *Stockje*, a considerable island dividing the upper *Zmutt glacier* into two branches, of which the stream between the *Stockje* and the *Wandfluh* is called on the Federal map *Stock Gletscher*, and that between the *Stockje* and the Matterhorn, *Tiefenmatten Gletscher*. It is by the latter branch that the descent is effected, in great part along the steep rocks of the *Stockje*. Near the bottom it is usual to take to the ice and then again return for 5 min. to the rocks, until the difficulties of the pass are over as the traveller finally gains the lower slopes of the *Zmutt Glacier*. This great ice-stream, highly interesting to the geologist from the varied rocks that are found in its moraines borne down from the inaccessible ledges of the Matterhorn, the Dent d'Hérens, the Dent Blanche, &c., is unpleasing to the

eye and tiresome to the feet from the extraordinary quantity of débris that covers its lower extremity, not merely accumulated in moraines, but strewn over the entire surface. It is with satisfaction that the traveller finally leaves the ice on the rt. bank about $\frac{1}{2}$ hr. above the end of the glacier. At the Châlets of Staffel one of the regular tracks of the Zermatt tourist leads the traveller along the rt. bank of the torrent, which he should cross opposite to the hamlet of *Zmutt* by a bridge over a remarkable chasm, and, if he has not encountered unusual difficulties on the glacier, he will in about $1\frac{1}{2}$ hr. from the Staffel Alp, $4\frac{1}{2}$ hrs. from the summit of the Stockje, or in $5\frac{1}{2}$ hrs. from the col, reach *Zermatt* (§ 20, Rte. A).

The traveller is warned not to attempt a short cut by taking to the l. bank of the *Zmutt* Glacier in descending from the Stockje, as this involves additional labour and delay.

The ascent of the Dent Blanche (14,318') is an expedition which can be recommended only to first-rate mountaineers. It appears to have been achieved but once, and an interesting account of it is given in the first number of the 'Alpine Journal,' by Mr. T. S. Kennedy, who, after an unsuccessful attempt on the 9th July, 1862, returned to the attack on the 18th of that month, accompanied by Messrs. W. & C. Wigram, with J. B. Croz as guide, and one of the Kronigs of Zermatt as porter.

After reaching the Glacier de Ferpècle by the usual rte. from the Châlets of Bricolla, whence they had started at 3 A.M., they bore to the l. along the base of a precipitous rocky slope, and mounted by a steep and crevassed part of the glacier to the ridge of the mountain, which stretches from the summit towards the Col d'Hérens. Here Mr. C. Wigram, not being in good training, found it necessary to halt. The ascent lay at first over loose rocks, and then up an ice-slope to a little plateau at the lower end of the main arête. This is formed of projecting towers and pinnacles of rock,

alternating with very steep slopes of ice, and the course lies sometimes round the base of the rocks, sometimes along the edge of the arête. In addition to the inevitable difficulties of the way, the weather was extremely unfavourable, violent wind and clouds sweeping round the peak of the mountain. In one place a rock covered with snow, and with a slope of 52° , was climbed on hands and knees, and at last the top of the arête was found to consist of an overhanging cornice of snow. The actual highest point, 6 or 7 ft. higher than the nearly level ridge, overhung so much that it was thought too dangerous to trust a man's weight to it. The descent was found to be quite as difficult as the ascent, and 10 hrs. were spent in mounting and returning along the arête. The whole expedition from Bricolla and back again, with but few and short halts, took 16 hrs.

The Matterhorn, though naturally connected with this Rte., is more conveniently described in connection with Zermatt and Breuil (§ 20, Rte. B).

ROUTE E.

SIERRE TO ZERMATT, BY THE VAL D'ANNIVIERS AND THE TRIFT JOCH.

	Hrs.' walking	Eng. miles
Niouc . . .	$1\frac{1}{2}$	$4\frac{1}{2}$
Vissoie . . .	2	6
Ayer . . .	$1\frac{1}{2}$	4
Zina . . .	$1\frac{1}{2}$	$4\frac{1}{2}$
Zermatt . . .	9	15
	<hr/> 15 $\frac{1}{2}$	<hr/> 34

Very few valleys in the Alps lie through such beautiful and varied scenery as the *Val d'Anniviers* (Germ. *Einfisch Thal*), or lead to passes so singular and so grand as both of those from thence to Zermatt. A good mule-path is carried as far as Zinal, and very fair mountain inns have been opened at that place and at St. Luc. A tariff for guides has been established, fixing 5 fr. as the ordinary daily pay, with an addition of 1 fr. to the commune for the maintenance of paths.

The latter is an unusual charge, but it is fair to say that a good deal has been done by the natives to facilitate the visits of strangers.

The Rhone is crossed by a bridge about $\frac{3}{4}$ m. E. of Sierre (§ 21, Rte. A), and then a char-road to the rt. leads in $\frac{1}{3}$ hr. to the opening of the gorge of Pontis, through which the *Navisanche* descends to join the Rhone. Avoiding the bridge which crosses that stream to Chippis, a mule-path mounts rather steeply on the rt. bank to the village of *Niouc*. There are few finer defiles in the Alps than that through which the *Navisanche* has cut its way to join the Rhone. The ravine is in some parts reduced to a mere cleft, reminding the traveller of some of the more striking scenes in the gorge of the *Via Mala*; but little is seen from the track, which lies at a great height above the stream, and the new path, which has in two or three places been pierced by a short tunnel through the rock, is far less picturesque, though also less laborious and shorter, than the old way. The scenery, even with this deduction, is extremely beautiful. The hamlet of Fang, lying in the midst of fine walnut-trees, is passed, and soon after the spire of a church comes into view. This belongs to

Vissoie, the principal village of the valley. It has no inn, for till lately there was none in the entire valley. Hospitality was formerly obtained from the *curé*, but a traveller wishing to halt in this neighbourhood should mount the steep E. slope of the valley to St. Luc, where there is a very good inn, convenient for several passes and excursions (Rtes. I and K). The traveller cannot fail to be struck by the large number of villages and scattered houses seen in this valley. Even more than in the adjoining Val d'Hérens the natives lead a nomadic life, and each family has a number of dwellings, which sometimes exceeds that of the inmates. Fires have been particularly destructive here; few villages have escaped, and that of St. Luc has been twice consumed within the last 20 years.

Evidence of the industry of the people is seen in the unusual number of water channels, often several miles in length, by which the bare mountain-slopes have been made to burst into verdure.

A track along the rt. bank leads from Vissoie to *Mission* and *Ayer*, both poor-looking places, the former opposite the fork of the valley where the stream from the Val de Torrent joins the main branch of the *Navisanche*. Above Ayer there are no winter dwellings, the numerous hamlets consisting only of *mayens*. About 6 m. farther the torrent is crossed to the l. bank, and the track ascends through pine forest, opening again at a higher level, where are several clusters of houses, the highest of which is called *Zinal*. A good and clean little mountain inn has been opened here, but the accommodation is limited.

Those who may not intend to cross either of the passes to Zermatt should not fail to mount to the *Arpilletta Alp*, commanding a magnificent view of the W. side of the *Weisshorn*, with the adjoining peaks of the *Schallhorn* and *Rothhorn*, inclosing the *Glacier de Moming*, a scene worthy of comparison with that from the *Belvedere* above *Macugnaga*. Farther S. is the great *Zinal* glacier, or *Glacier de Durand*, running up to the snow-col described in the next Rte. The glacier is said to be still better seen from the *Mont de la Lée*, on the opposite or W. side of the valley. A more considerable expedition is the ascent of *Lo Besso*, a very remarkable obelisk of bare rock, rising from the E. bank of the glacier too steeply for snow to lie upon it, 12,057 ft. in height. Two attempts to ascend the *Weisshorn* along the N. arête from *Zinal* encountered unavoidable obstacles, and that beautiful peak is probably to be reached only from the *Schallenberg* side. (See § 20, Rte. A, Excursion 10.) It is probable that a mountaineer, with good guides, might find a new and interesting way from *Zinal* to St. Niklaus, by the head of the *Turtman Glacier* and the *Barrhorn* (11,919').

A very interesting way to St. Luc is noticed in Rte. I.

The passage of the Trift Joch, or Col de Zinal, might formerly be reckoned among the most difficult in the Alps, especially when, as in the account given by Mr. Hinchliff in 'Peaks, Passes, and Glaciers,' it was made from Zermatt; but the somewhat formidable difficulties of the rocks on the Zinal side have been in great part removed by the aid of a ladder fixed to the rock, and towards the summit by an iron chain 70 ft. long, which helps the traveller over the most awkward part of the climb.

A track crosses the torrent a little above Zinal, where the glacier, though near at hand, is not visible, as just below its lower end the valley is nearly closed by a barrier of rock, through a cleft in which the stream has cut its way. The track mounts over this barrier, and keeps along the W. bank at some height above the ice, then takes to the moraine, and the traveller enters on the *Glacier de Zinal*, fully 2 hrs. from Zinal. The lower part is free from difficulty, and the course taken is to cross diagonally to the foot of Lo Besso, which is here an extremely grand object. The traveller is now confronted by a series of rapids, in which the glacier descends from the upper basin to the lower level hitherto traversed. Early in the season the crevasses are not so formidable but that the ascent over the ice is still possible, but it is generally necessary to take to the moraine on the E. bank, just under Lo Besso. Above the ice-rapids the traveller reaches the upper level of the glacier, and finds himself in the midst of one of the grandest scenes in the Alps. The amphitheatre enclosing the head of the Zinal Glacier comprises at least four peaks exceeding 13,000 ft. in height—the Rothhorn (13,855'), the Gabelhorn (13,363'), the Dent Blanche (14,318'), and the Grand Cornier (13,022')—and the steepness and proximity of this mighty range greatly enhance the effect, which in its way is

hardly equalled elsewhere. The traveller who has reached Zinal without intending to cross the range to Zermatt should not fail to extend his excursion to this point. Projecting buttresses of rock descending from the above-named peaks divide the snow-fields into separate bays, and that leading to the Trift Joch is seen to the l. of a ridge descending from the Gabelhorn. After climbing some steep snow-slopes to the foot of the precipices, the ascent lies up rocks of extraordinary height and steepness, and the help of a practised guide is required to hit off the exact points where the artificial aid provided by the people of Zinal has relieved the pass of its most formidable difficulties. It is desirable to pass as early as possible in the day, as the only real danger is on the snow-slopes below the final ascent from fragments of rock that are loosened when the sun begins to tell on the crest of the ridge.

Mr. Bonney, who passed in 1860, found 5½ hrs., exclusive of halts, sufficient for the ascent from Zinal to the summit, and rather less than 3½ hrs. for the descent to Zermatt.

The *Trift Joch*, or *Col de Zinal*, 11,614 ft. in height, and marked by a small wooden cross, is a mere notch in the ridge between the Gabelhorn and the *Trifthorn* (12,261'), a few ft. in width, and so sharp that it is possible to sit astride with one leg on each side of the ridge. The view of Monte Rosa and the Saas Grat is of the grandest character, and a mountaineer cannot approach Zermatt by any way which will give him a more indelible first impression than by this or the following Rte. The view backwards, where the rocks seem to plunge vertically down towards the head of the Zinal Glacier, is scarcely less striking. The descent by a steep snow-slope will not appear formidable to the experienced mountaineer, but a bergschrund separating it from the upper level of the glacier may sometimes give a little trouble. The course now lies across the névé of the *Trift Gletscher* to the base of a spur

projecting from the Rothhorn, where care should be taken to avoid the path of falling blocks of ice. From hence the descent lies in part over the ice, and partly by the moraine of the Trift Glacier. At the base of the glacier the way is along the stream of the Triftbach, and it is possible to descend direct to Zermatt through the steep and narrow ravine of the *Trift*, or to find a rather easier path over the mountain to the rt. of the stream.

Until passed in 1855 by Mr. Chapman, and in 1857 by Mr. Hinchliff and two friends, this pass was not known to travellers, and only by a vague tradition to the people of Zermatt. It is now deservedly frequented by adventurous mountaineers, but has more recently found a rival in the pass next described. Several of the Zermatt guides are well acquainted with the rte., and an efficient guide, named Joseph Viennin, of Ayer, in the Val d'Anniviers, is competent to lead travellers over either this or the following pass.

ROUTE F.

ZINAL TO ZERMATT, BY THE COL DURAND, OR COL DE LA DENT BLANCHE.

The authors of the Swiss Federal map have adopted the name *Glacier de Durand* for that more generally known as *Glacier de Zinal*. The decision is unfortunate, as that name has been applied, in turn, to several other glaciers in this district. It very probably has the same origin as the names Val d'Hérens or d'Erin, Dent de Rong, &c. Be this as it may, the name *Col Durand* has been given on that map to the pass at the head of this glacier, over the ridge connecting the Dent Blanche with the Gabelhorn, first traversed in August 1859 by Messrs. W. & G. S. Mathews, with Jos. Viennin, of Zinal, and two Chamouni guides. The pass was called by Mr. W. Mathews *Col de la Dent Blanche*, by which name

it is known in the Val d'Anniviers. It is decidedly longer than the Trift Joch, requiring from $10\frac{1}{2}$ to $11\frac{1}{2}$ hrs., exclusive of halts. As well as the last pass, it is advantageous to take this from the Zinal side, and so enjoy the charm of surprise on gaining the grand view from the summit. There is the further advantage, that if the bergschrund on the Zinal Glacier were found impracticable, there would yet be time to reach Zermatt by the Trift Joch. This pass forms the S. termination of the Zinal Glacier, being the lowest point, and about half-way in the range connecting the Dent Blanche with the Gabelhorn. It is seen from many of the higher points in the Val d'Anniviers, and even from the village of St. Luc (Rte. I), with the peak of the Matterhorn, here called Grande Couronne, towering behind it.

Having reached the upper névé of the Zinal Glacier in about $3\frac{1}{2}$ hrs. from the inn, the traveller, instead of bearing to the l., keeps on about due S. towards an island of rock which divides the upper slope of névé descending from the col. Keeping E. of this rock, the ascent here becomes steep and laborious, and some distance higher up the bergschrund is encountered, which is the only serious difficulty of this rte. This is, however, except early in the summer, a very formidable one, as it was found by Messrs. Mathews in the first passage of the col. Examined through a glass by the writer in Sept. 1853, it appeared to extend without a bridge right across the head of the glacier, with a breadth of from 20 to 30 ft. Once over this barrier, the ascent presents no further difficulty, and the summit of the col (11,398') is reached in 6 or $6\frac{1}{2}$ hrs. from Zinal.

The view from the summit which bursts suddenly upon the traveller, or, better still, some way lower down from the angle of the Ebihorn, is by some excellent judges considered to be the grandest in the Pennine Alps. Right opposite, the marvellous peak of the Matterhorn presents its most imposing

aspect, flanked to the rt. by its rival the Dent d'Hérens. To the l. is the mass of the Monte Rosa range, somewhat foreshortened, and N. of the Weissthor rise the Strahlhorn and Rympfischhorn. As compared with the neighbouring pass of the Trift Joch, the panorama loses the remaining peaks of the Saas Grat, but the loss is more than made up by the Matterhorn, not seen from the rival pass. The peaks surrounding the head of the Zinal Glacier must not be forgotten, nor that of the Dent Blanche, seemingly close at hand, though separated by a rocky tooth (Pointe de Zinal) crowning the ridge which divides the *Schönbühl* from the *Hochwäng* Glacier.

The descent lies by the head of the latter, bearing to the l. so as to gain the slopes of the *Ebihorn* which separates it from the small *Arbe Glacier* to the E. It would appear that the same course has not been followed by the few travellers who have crossed this way. While so experienced a mountaineer as Mr. Tuckett encountered considerable difficulty in the descent at the head of the *Hochwäng* Glacier, Mr. Bonney crossing in the same season from Zermatt found none whatever at this side of the col. The latter gives the following advice to those who ascend after having reached the névé above the *Ebihorn*:—‘Of the two apparent cols visible when on the snow, take the one to the left. We took the other and found the descent on the farther side difficult. . . . The view from the side of the *Ebihorn* just when the snow is reached is perhaps the finest I have seen near Zermatt: it includes everything from the Col d'Erin to the Alphubel. It is a little higher than the Hörnli, and is within the reach of ladies who are good walkers.’ The descent from the col to the foot of the *Ebihorn* is made in 2½ hrs: It is possible to keep along the slopes N. of the *Zmutt Glacier*, and to reach Zermatt by the l. bank of the torrent; but Mr. W. Matthews advises travellers to cross at once to the rt. bank of the glacier, and then

follow the usual track to Zermatt (§ 18, Rte. E).

It is important to start from Zinal one or two hours before sunrise, as the difficulties of the Zinal Glacier are much increased when the sun has begun to tell on the surface.

ROUTE G.

EVOLENA TO VISSOIE, BY THE VAL DE TORRENT.

The western branch of the Val d'Anniviers which joins the Zinal branch about 1 hr. S. of Vissoie, is called *Val de Torrent* (Germ. *Torrentthal*). This is connected with the Val d'Hérens by four different passes, one of which only is known to the editor. They are all of about the same height, and probably equally free from difficulty. The head of the Val de Torrent is closed by a considerable glacier, *Gl. de Torrent*, or *Gl. de Moiry*, formed in the acute angle between two ridges that diverge from the Grand Cornier. One of these divides the Val d'Hérens from the Val de Torrent; the other, running due N. to the Corne de Sorebois, forms the separation between the Zinal and Torrent branches of the Val d'Anniviers.

1. *Col de Bréona* (9,574'). This is the southernmost of the above-mentioned passes, and should be the most interesting, as it descends upon the *Torrent Glacier*, about 3 m. N. of the Grand Cornier.

2. *Col du Châtel*, or du Zate (9,433'). This is said to be the steepest of the passes here named, and not to command any distant view.

3. *Col de Torrent* (9,593'). This is the pass usually taken by the people of Evolena. It is free from difficulty, but scarcely fit for laden mules.

‘Leaving Evolena, pass eastwards up the mountain slopes, and to the south of Mont Colaïre, towards a gap in the ridge dividing the Val d'Hérens from the Val de Moiry or de Torrent. In

3 hrs. the top of the slopes is gained and $\frac{1}{2}$ hr. more takes the mountaineer up the last ascent, a stiff rise over flat rocks intermingled with snow patches and shale banks, to the Col de Torrent. A rude cross in the gap marks the col. The chain falls away to the north, but rises again to a higher elevation called the Sasseneire. Looking back westward, the view displays the range from the Mont Collon to the Pigne d'Arolla and the Mont Pleureur, with the Grand Combin and the Vêlan in the distance. The view eastward is not so fine, but, below the col, a little snow-fed lake forms a pleasing object in the wild scenery around, the snow on this side being more abundant than on the Evolena side. The descent to the lake is made in 15 min. by a well-marked track. Descending the slopes beyond, still eastwards, the route lies amongst groups of fantastically-shaped rocks. These are at times surmounted by little heaps of stones piled up to serve as guide-posts. Ultimately a mountain stream is reached, along which a path leads in $1\frac{1}{2}$ hr. from the lake down to the Val de Torrent. The glacier at its head is not seen, and the scenery reminds the traveller of a Highland strath.—[F. W. J.] A mule-path leads down to *Cremenz*, the only village in this branch of the valley, close to its junction with that of Zinal. If the traveller be bound for Zinal or St. Luc, he will do well to turn to the rt., crossing both streams above the junction, and gaining [the main track on the E. side of the valley at Mission (Rte. E). To reach Vissoie and Sierre he should keep from *Cremenz* along the l. bank of the Navisanche till he reaches the bridge opposite to *Vissoie* (Rte. E), 8 hrs. from Evolena by this rte.

Leontodon Taraxaci is found in abundance near the summit of the pass.

4. *Pas de Lona* (8,926'). This is said to be an easy pass, traversed by a good mule-path. It leads, in 6 hrs., from *Eison*, about $1\frac{1}{2}$ hr. below Evolena, to the Val de Torrent, about $\frac{1}{2}$ hr.

above *Cremenz*. The pass lies between the *Sasseneire* (10,692') and the *Bec de Bossons* (10,368'). Both are said to be accessible, and the latter, though somewhat lower, is probably better situated for a panoramic view of the ranges enclosing the valley of the Rhone.

ROUTE H.

EVOLENA TO ZINAL, BY THE COL DE SOREBOIS.

Before this pass was known, the few travellers who visited Zinal were forced to make a long detour by *Cremenz* and *Ayer*, in order to reach that place from Evolena. This pass affords a shorter and much more interesting way. In its natural condition it was very steep, but a mule-track has been made, and English ladies have ridden across, accomplishing the whole distance between Zinal and Evolena in 12 hrs.

Having reached a hut which stands at the junction of the brook descending from the Col de Torrent (last Rte.) with the main stream of the Val de Torrent, the traveller crosses the latter stream, passing a deserted hut, and ascends rather N. of E. towards the col. 'The last ascent is steep, amongst rocks and snow-patches, but a little more to the N. a track has been recently made which will prove less fatiguing. The summit of the col, which will be reached in 2 hrs. from the hut, is 9,259 ft. high. The view back is confined by the higher elevation of the Torrent chain, but eastwards, towards the Weisshorn and the range on the farther side of the Val d'Anniviers, it is more interesting. After descending from the col, strike away to the l. or N. of the stream, and in $\frac{3}{4}$ hr. a considerable cattle-alp is reached. The descent thence to Zinal is very steep, and difficulty may be found in getting down the cliff to the forest below, if, in ignorance of the pass, precise directions are not obtained at the châlet. Zinal will be reached

in $1\frac{1}{4}$ hr. from the châlet.'—[F. W. J.] It has been suggested that an active mountaineer might take the Pigne de la Lex and the upper part of the Torrent Glacier in his way from Zinal to Evolena, but this would involve a very long day's walk.

ROUTE I.

VISSOIE TO TURTMAN, BY THE PAS DE BŒUF AND THE TURTMAN THAL.

The *Turtman Thal*, which opens into the valley of the Rhone at the little town of that name, well deserves a visit from any traveller exploring this neighbourhood. Occupied by forest, and rock, and mountain pastures, it contains no permanent habitations. The numerous hamlets which are laid down on maps, and may be seen from the mountains enclosing the valley, all consist of *mayens*, closed in winter when the people descend to the valley of the Rhone, and in summer when they are engaged in the higher pastures. A little inn is, however, now open at Grünen during the summer, and travellers will no longer be forced to pass the night there without food or shelter, as happened to the writer in August, 1845. (See next Rte.)

From Vissoie a path mounts the steep E. slope of the valley to *St. Luc* (5,453'), where a good little inn (*Hôtel de Bella Tola*) has been lately opened. This village has risen again after being burnt to the ground in 1844, and again in 1858. It commands a fine view of the valley, extending beyond the Col Durand to the peak of the Matterhorn. It is reached from Sierre by a direct path turning off to the l. from that leading to Vissoie.

[Another interesting route by which this place may be approached from the valley of the Rhone, is by a torrent which joins that river opposite the town of Leuk (Loèche), and leads up to the *Illsee*, a little lake lying under the *Ill-*

horn (8,939'), a curious peak hollowed like a crater, which is said to command a fine view. Passing a col SE of the mountain, *St. Luc* may be reached in 5 or 6 hrs. from Susten or Leuk (§ 21, Rte. A).]

Since a comfortable inn has been opened there, *St. Luc* has become an attractive spot to mountaineers. The landlord is a good mountaineer, who in 1862 made a very bold though unsuccessful attempt at the ascent of the *Weisshorn*. Under his guidance a very interesting walk may be made from here to Zinal, along the range separating the Turtman Thal from the Val d'Anniviers. Keeping to the W. side of the Tounot (Rte. K), the track of the Pas de la Foreletta is traversed at right angles, and then the way lies by a small glacier descending from the peak of the Diablons. A glorious view of the *Weisshorn* and the Turtman Glacier is now gained, and the descent to Zinal by the *Arpitetta Alp* (Rte. E) lies through Alpine scenery of the grandest character.

The chief object of most visitors to *St. Luc* is the ascent of the *Bella Tola* (9,929'), an expedition easily made by ladies. It may be observed as a general rule that all the detached summits lying between the great ranges of the Pennine and Bernese Alps command panoramic views that amply reward an ascent, when made with favourable weather. That of the *Bella Tola* is now one of the most easily accessible, as the villagers have made a mule-track by which the summit is reached in 3 hrs.

The most direct way from *St. Luc* to the Turtman Thal is by the *Pas du Bœuf* (9,154'), a pass lying S. of the *Bella Tola* and the adjoining summit of the *Borternhorn* (9,745'). The descent on the E. side lies through the lateral glen called *Borternal*, passing the Châlets of Pletschen. The mule-track between Turtman and Z'meiden is reached in 6 hrs. from *St. Luc*. The descent to Turtman is in great part through a vast pine forest which once covered the entire middle region

of the valley; but of late years the axe has made extensive clearings. The track lies along the l. bank, and on approaching the valley of the Rhone descends rather steeply above the gorge in which the waterfall (§ 21, Rte. A) remains concealed from the traveller following this route. In about $8\frac{1}{2}$ hrs. from St. Luc the traveller reaches *Turtman*.

It will be observed that in following this or the following route the traveller leaves a population speaking a patois allied to modern French, to enter amongst a people speaking the German dialect of the upper Valais. Some writers have found, or fancied, the existence of marked local peculiarities in the dialect of the *Turtmanthal*. It is, to say the least, highly improbable that a people not isolated, but spending more than half the year in the valley of Rhone, should maintain such a barrier between themselves and their neighbours. The valley has, properly speaking, no inhabitants. Certain villagers of the main valley owning the woods and pastures resort to the mountains during the summer. The greater part descend annually into the valley of the Rhone so early as the 8th September.

ROUTE K.

ST. LUC TO ST. NIKLAUS, BY THE Z'MEIDEN PASS, AND THE JUNG JOCH.

This is a long but interesting day's walk of fully 11 hrs. exclusive of halts. An hour more must be allowed if taken from St. Niklaus, as the ascent on that side is much longer. A local guide is desirable, as both passes are so slightly traced that it is often impossible to be sure of the way.

Ascending from St. Luc the traveller reaches a point from whence he may take a last view of the beautiful Val d'Anniviers, and then mounts by a gentleslope towards the *Tounot* (9,921'), a bold pinnacle of quartzite, on the l.

shoulder of which lies the *Z'meiden Pass*. In approaching the col an extraordinary scene of desolation is passed on the rt. Some huge mass of mountain seems to have fallen and covered the slopes with its ruins, and similar masses, not on quite so vast a scale, have covered the basin on the E. side of the pass. The botanist may gather *Woodsia hyperborea* and some other rare plants on the rocks near the summit. A wild basin strewn with fragments of rock is now traversed, and further peaks come successively into view until, on approaching the verge of the steep descent into the *Turtman Thal*, near some hovels where herdsmen resort during the height of summer, a very grand view of the head of the valley opens before the traveller. The great Glacier of *Turtman* is seen backed by the *Barrhorn* (11,919') and the *Brusheggghorn* (12,618'), and doubtless offers a passage to the foot of the *Zinal Glacier* (Rte. E). If the traveller be bound for *Turtman*, he may descend diagonally along the W. slope of the valley, but otherwise he must take a more direct path leading in 5 hrs. from St. Luc to *Z'meiden*, a group of *mayens*, adjoining which is another hamlet called *Grüben*, where a little inn has been lately opened which affords facilities for exploring this wild valley. *Linnaea borealis* has been found in this neighbourhood.

'The inn at *Grüben* is small, but good and clean; the landlord is a good cook and a trustworthy guide.' — [R. S. W.] Among many excursions the ascent of the *Schwarzhorn* (9,594'), commanding a splendid panoramic view, may be recommended. Another excursion is that to the *Turtman Glacier*, the lower end of which is 2 hrs. from the inn. There is a remarkable cascade appearing to fall into a chasm in the ice, and a path passing at some height above it leads in 1 hr. from the foot of the glacier to the middle region, which is easily accessible and very free from crevasses. Another and more direct way to gain the surface, is to

follow for about $\frac{1}{4}$ hr. the moraine on the l. hand (i.e. rt. bank?).

In 1862 two French travellers, with Franz Andermatten and François Devouassoux as guides, effected a difficult pass from Grûben to Randa by the Turtman and Bies Glaciers.

A mule-track has lately been carried across the high and steep range separating the head of the Turtman Thal from St. Niklaus. It probably traverses the *Jung Joch*, till lately a little-known and rarely-used pass. The ascent to it from Grûben is by a long steep slope, nowhere difficult, but somewhat fatiguing. Towards the summit some patches of snow are traversed, and the actual pass is one of the notches in a jagged ridge which on the E. overlooks a wilderness of huge blocks mingled with snow, the resort of ptarmigan and chamois. By climbing a point to the rt. of the col a wide view is gained over the ranges to the W., extending to Mont Blanc. The descent is very rough, with little if any trace of path, until after struggling across a savage scene of ruin it emerges into a wild upland glen called Jung Thal, which leads to the chapel and chalets of Jung. Here we come upon one of those magnificent scenes that so often make the Alpine wanderer forget fatigue and privation. The noble forms of the Mischabelhörner, crowned by the Dom, are here seen in their full beauty, and farther south is the range of Monte Rosa. Bearing to the rt., a long and steep descent into the valley, which lies so deep as not to be visible from above, takes the traveller in 6 hrs. from Z'meiden to St. Niklaus (§ 20, Rte. A). The height of the Jung Joch has been over-stated. It is, apparently, about 9,000 ft.

Another way not much more laborious, and rewarding the traveller by a more extensive view, is to ascend from Z'meiden to the *Dreizehntenhorn* (10,522'), the highest summit N. of the Jung Pass, and descend from thence to St. Niklaus.

In going from Zinal to St. Niklaus,

there is another pass, more direct than the Z'meiden Pass, called *Pas de la Forcletta* (9,898'). The ascent commences a little S. of Ayer (Rte. E), and the pass lies between the *Diablons* (11,836') and the *Roc de Budri* (10,303'), descending to the Chalets of Zerbitzen, near the foot of the Turtman Glacier, and about $\frac{3}{4}$ hr. above Z'meiden. Further information is desired.

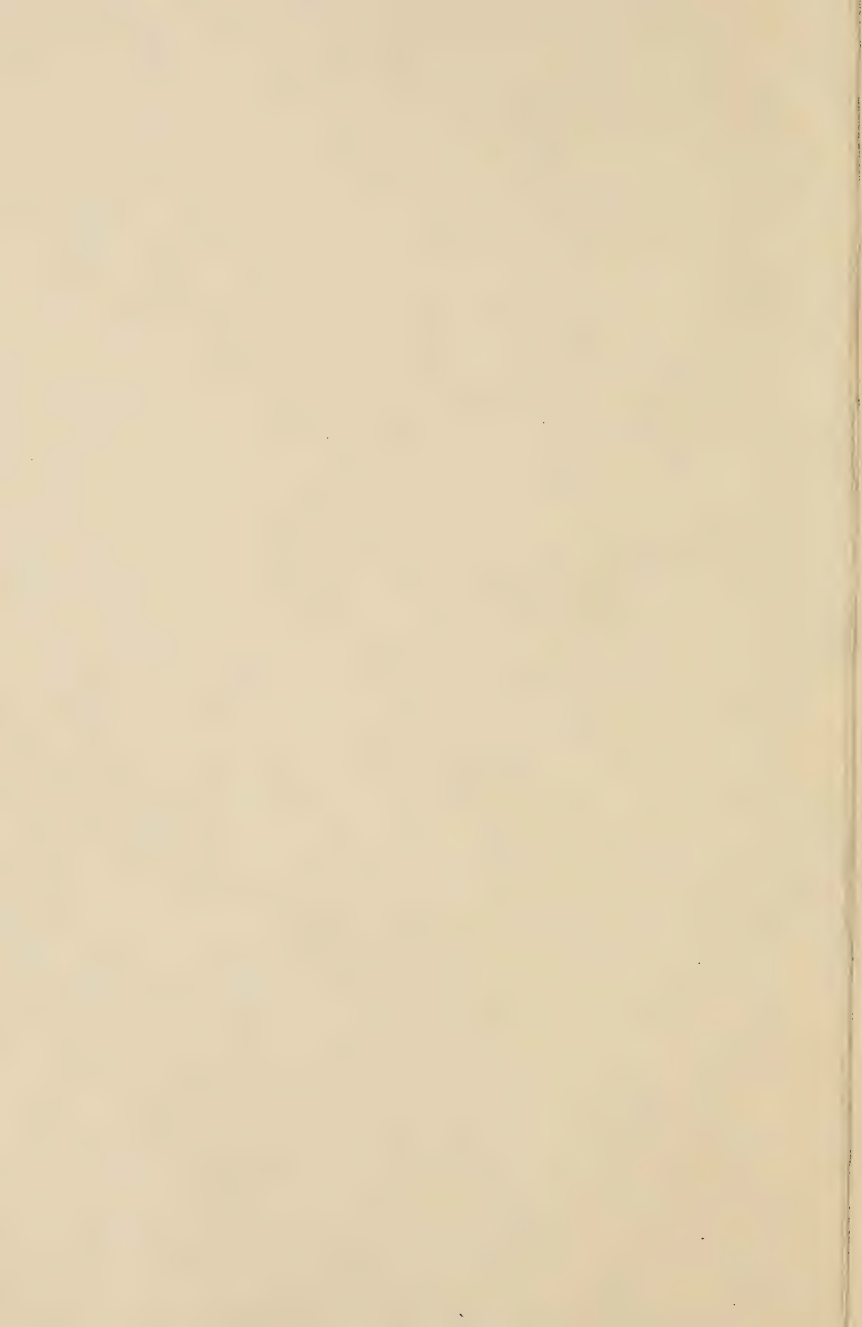
The editor has no information respecting two of the minor valleys belonging to this district, which pour their waters directly into the Rhone. The first is a glen lying on the N. side of the Bec de Bossons (Rte. G) and opening into the valley of the Rhone at Reschy, about 5 m. SW. of Sierre; the other is that formed by the Mühlebach, which crosses the high-road of the Simplon about half-way between Turtman and Visp. It rises in a small tarn N. of the Dreizehntenhorn, and lying between the *Schwarzhorn* (9,594') and the *Augstbordhorn* (9,785'). Both the latter summits are said to command fine panoramic views. The first is reached from the Turtman Thal (see above), the second from Stalden (§ 20, Rte. A).

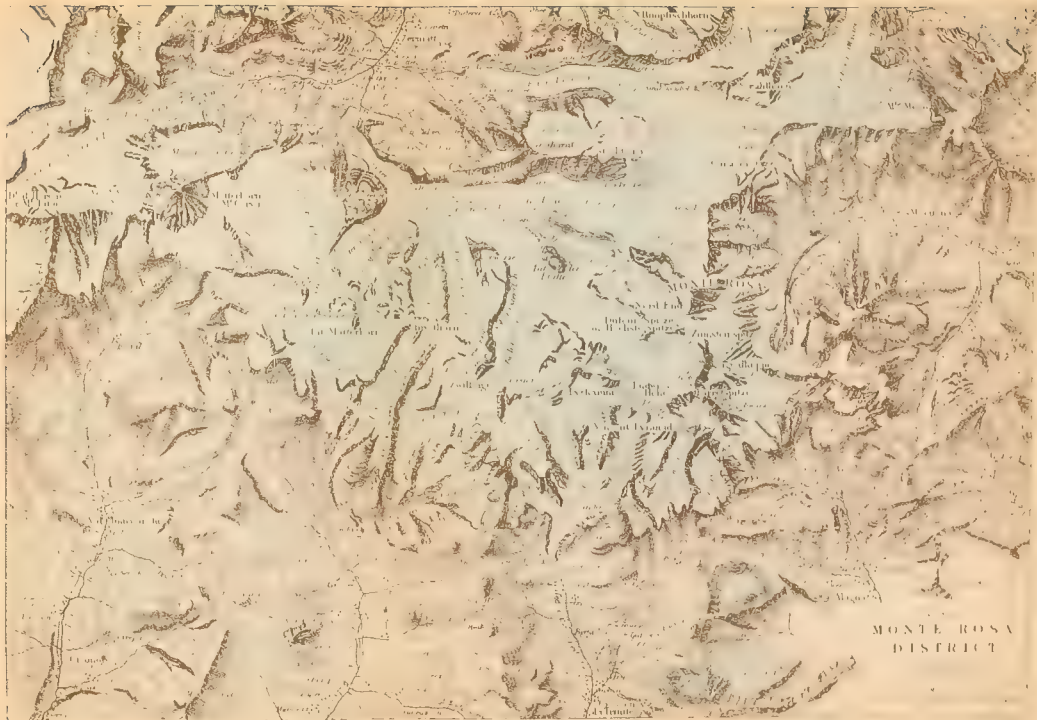
SECTION 20.

MONTE ROSA DISTRICT.

In describing the range of Mont Blanc (§ 16), it was seen that that mountain, with its attendant peaks, is naturally limited by two deep trenches parallel to the direction of the range, and by well-defined passes which mark an orographic separation between it and the adjoining mountain groups. No such arrangement is found in the great mass which is included in the present section.

The central range of Monte Rosa, which appears to originate in the intersection of two lines of upheaval, throws out a number of ridges that





radiate afar and gradually subside into the plain of N. Italy, covering an area much larger than that of most of the other districts described in this work. No convenient mode of subdividing it has, however, been suggested, and we propose to include along with the central mass the range of the Saas Grat to the N., and the minor ranges to the S. and E. that enclose the so-called Italian valleys of Monte Rosa. The natural limits of the district are therefore defined on the N. side by the two branches of the Visp torrent. Following the W. branch through the Nicolai Thal, crossing the Col de St. Théodule, descending by the Val Tournanche to Chatillon and to Ivrea, and passing round the base of the mountains by Arona, along the Lago Maggiore, and up the valley of the Toce, to Vogogna, then ascending by the Val Anzasca to the Pass of Monte Moro, the circuit is completed by the descent through the Saas Thal to Stalden. Within the line so traced, exceeding 300 m. in length, all the ranges properly belonging to this group are included; but it appears convenient to add the Matterhorn and the Dent d'Hérens, although orographically connected with those enclosing the Val Pellina, described in § 18.

It cannot fail to strike the reader who examines the map of this district, that the direction of the ranges and the depressions offers a marked contrast to that prevailing throughout the adjoining regions of the Alps. Unless in a small part of the Italian valleys, the direction here is either parallel or perpendicular to the meridian. Monte Rosa itself is best considered as the intersection of a great N. and S. ridge extending from the Balferin through the Saas Grat and the highest peaks of the mountain itself to the Vincent Pyramide, and thence through the range that bounds the Val de Lys, nearly to Ivrea, with the transverse range lying between the Dent d'Hérens and the Pizzo Bianco near Macugnaga. It is worthy of remark, that all the

minor ridges on the N. side of the frontier are parallel to this latter range. It is sufficient to point out the corresponding depressions occupied by the glaciers of Gorner, Findelen, Täsch, Kien, Graben, &c.

Although the peak of Mont Blanc overtops all those of the Monte Rosa range, the average height of the latter greatly exceeds that of its western rival. In the first, none of the secondary peaks attain to 14,000 English feet, while the three higher summits of Monte Rosa surpass 15,000 ft., and four others lie between 14,000 and 15,000 ft. Within the same limits are the four highest peaks of the Saas Grat, and also the Lyskamm, not to mention the adjoining summits of the Weisshorn, the Matterhorn, and the Dent Blanche. The same inference is drawn from a comparison of the passes. Of the thirteen highest passes hitherto effected in the Alps all but three cross the ridges of this group.

It is the opinion of many of the most competent judges, that for grandeur, beauty, and variety, the valleys descending from Monte Rosa are entitled to preeminence over every other portion of the Alps, and perhaps, if we regard the union of those three elements, over every other mountain region in the world. Nature is inexhaustible in the combination of her attractions, and certainly there are many other scenes in the Alps which may challenge comparison with whatever is most grand and most beautiful; but one who would learn thoroughly to enjoy Nature in those aspects cannot do better than give ample time to the exploration of the district included in this section. After spending some weeks amid the sterner scenery of Zermatt and Saas, he will find fresh loveliness in the marvellous contrasts that abound in the valleys of the Italian side. A summer's tour devoted to this district, wherein days of exertion, spent in gaining the higher peaks, are made to alternate with days of repose, which need not here be idleness, will certainly not

exhaust the beauties of the country, and will probably leave deeper impressions than a rapid excursion extending over a considerable part of the Alps.

Good accommodation is now found at several of the most interesting points, and tolerable quarters are available almost everywhere.

ROUTE A.

VISP TO ZERMATT—EXCURSIONS FROM ZERMATT.

	Hrs.' walking	Eng. miles
Stalden . . .	1½	5
St. Niklaus . .	2½	7
Randa . . .	2½	6½
Täsch . . .	2½	2½
Zermatt . . .	1½	4½
	8½	25

The only easy approach to the mountaineering metropolis of the Rosa District is from Visp or Viège, on the high-road of the Simplon, 28 m. above Sion, the present terminus of the railway, which is to be carried on to Brieg (see § 21, Rte. A). The ascent being about 3,000 ft., the pedestrian may allow more than an hour's difference in ascending and descending the valley, about 7½ hrs. sufficing to reach Visp, while nearly 9 hrs. are usually spent in the ascent. The mules take fully 9 hrs. either way, besides nearly 2 hrs.' halt at St. Niklaus. A traveller intending to fix his head-quarters at Zermatt, and having more luggage than a porter can conveniently carry, is forced to hire a horse or mule, and will find it a good plan to send the animal on an hour or two before he starts from Visp, as a guide is quite unnecessary, and he will otherwise arrive long before his luggage. The charge for horses is rather high. Including *bonnemain* for the man in charge it is 5 fr. to Stalden, 10 fr. to St. Niklaus, 22 fr. to Zermatt. Men carrying a *chaise-à-porteur* receive 6 fr. a day; ordinary porters 5 fr. a day, the return

being at the same rate. It is desirable to start early from Visp, as the lower part of the valley is extremely hot.

The track leaves Visp on the rt. bank of the river, mounting very gently, as Stalden is not more than 300 ft. above the town.

The vines, which produce fair wine, and the wild flowers, announce a climate contrasting widely with the region of snow and ice in which both branches of the valley terminate. Among the wild plants are several scarce species: e. g., *Astragalus exscapus*, *Xeranthemum inapertum*, *Achillea moschata*, and *A. tomentosa*, &c. The mountains rise steeply on either hand, and the snowy peak of the *Balferin* (properly *Balenfirn*) (12,402'), standing in the fork of the valley, is a first example of that beautiful pyramidal form which prevails among the surrounding peaks. About 3½ m. from Visp the track crosses the valley at Neubrücke, and, amid scenery constantly increasing in beauty, soon reaches

Stalden (Inn: Zum Traube, humble quarters, but tolerable beds and good wine), a poor village (2,736') close to the junction of the *Gorner Visp*, issuing from the *Nicoluithal*, with the *Saaser Visp* from the Saas Thal. The track here begins to mount along the l. bank of the former stream. On the E. side of the valley may be seen several earth pillars, similar to, but less considerable than those of the Val d'Hérens (§ 19, Rte. A). The steepness of the slopes of the valley, and their loose texture, have made it difficult to maintain even a bridle-path in soil that is constantly washed away during heavy rain. The track makes several steep ascents and descents, crossing the river, and returning to the l. bank, with the *Bruschegg-horn* (12,618'), one of the peaks of the Weisshorn rising in the background. A manifest change in the climate and vegetation of the valley is perceptible before reaching

St. Niklaus (Inns: Croix Blanche; Soleil; both good village inns, with clean beds and moderate charges), the

chief village of the valley, 3,819 ft. above the sea. Both inns are often full at night, as ladies who fear a nine hrs.' ride to Zermatt break the journey here. An excursion is sometimes made in 2 hrs. from hence to the village of *Grächen* and the *Hunni Alp* above it, immediately overlooking the junction of the two valleys, and commanding a distant view of the Bernese Alps. Return in 1½ hr. A more interesting excursion may be made to the *Ried Gletscher*, a considerable glacier descending from the northern of the *Mischabelhörner*, whose existence would not be suspected from the valley below (see Rte. P).

St. Niklaus and the neighbouring hamlets suffered severely in 1855 from repeated shocks of earthquake, which were felt to a less extent in the adjoining districts, but whose force was mainly expended throughout the few miles between this place and Visp. Forty-nine shocks were counted, and slighter disturbances were renewed throughout the three or four following years. Scarcely a house in the village escaped serious injury, and many were entirely destroyed.

Above St. Niklaus the scenery increases in grandeur. The rocky walls on either side become higher and steeper, and the valley is contracted to a trench 2 m. in depth below the opposite peaks of the *Weisshorn* and the *Mischabel*, between which it passes. About 1 m. above the village the track crosses to the rt. bank, soon after passing the poor hamlet of *Mattsand*. At intervals the snowy summits of the *Breithorn* and the *Petit Mont Cervin* are seen at the head of the valley, but the more imposing peaks near at hand are concealed from view, except near *Herbrigen* (4,226'), rather more than 1 hr. above St. Niklaus, where the traveller gains a glimpse of the *Bruscheeggorn*. Several small torrents from the *Mischabelhörner* are crossed, which become formidable after a storm, and especially in the season of the melting of the snows. The valley opens out somewhat before reaching

Randa. A small inn (*H. du Dom*) was opened here in 1860. Its pretensions are not great, but it is very convenient for those who propose ascending the *Dom* or the *Täschhorn* (Excursion 11). This poor village (4,740') stands on rising ground, apparently the remains of a landslip, opposite to the small *Bies Glacier*, lying on the steep E. slope of the *Weisshorn*, at least 1,500 ft. above the level of the valley. Seeing the extreme steepness of the slope, and the absence of a retaining barrier, it is not easy to understand how the vast mass of ice clings to its bed. The apprehension thus inspired is not imaginary. In 1636, according to the perhaps exaggerated records of the time, the entire glacier fell into the valley, spreading fearful havoc before it. In December 1819, a considerable mass was detached, and though it fell a little on one side of the village, the blast of air was powerful enough to level most of the houses, and it is said that solid beams and roofs were blown away like straw to the distance of a mile from their former site. A barrier, formed across the river, threatened to renew here the disaster of the preceding year in the *Val de Bagnes* (§ 18, Rte. D); but some brave men of the valley, working at the peril of their lives, succeeded in cutting an opening for the waters. Above *Randa* the valley is nearly level for 2 or 3 m. A short distance beyond the village is the torrent from the *Kien Glacier*, and near at hand the remains of a *bergfall*, which is said to have overwhelmed a village with all its inhabitants. Near to a green basin, seemingly the filled-up site of an ancient lake, is the village of *Täsch*, whence lie two routes to *Saas* (Rte. O). Lodging was formerly obtained at the curé's house, but with inns at *Randa* and at *Zermatt* it can rarely be necessary to halt here. The torrent from the *Täsch Glacier*, and another descending from the *Rothhorn*, are often swollen on warm afternoons, and render the passage rather troublesome. After ascending for some way

The daily charge for a horse or mule with a boy is 10 fr., the visit to the Riffel Inn being counted as a day's work. When it is possible to take horses across the Col de St. Théodule, the charge to Val Tournanche is 40 fr.

The names of several of the best guides are given in the Introduction (Art. Guides).

Irrespective of other attractions, the neighbourhood of Zermatt is full of interest to the geologist, the mineralogist, the botanist, and the entomologist. Good specimens of minerals are to be had from Perrin. Ignatz Biner, a good guide, is well acquainted with most of the flowering plants of the neighbourhood. Specimens may be procured from him, or from others in the village. A list of the rare plants would include a large portion of the Alpine flora, and is unnecessary, as most of them will be pointed out by guides, or are so common that the botanist cannot miss them. A few may be mentioned which appear specially interesting. Near the village are seen growing close together some plants of the warm region with high mountain species that have descended from the surrounding peaks, especially through the ravine of the Trift. Thus *Stipa pennata*, *Euphrasia lutea*, *Echinopspermum deflexum*, and *Hieracium multiflorum* are seen behind the village close to *Gnaphalium*, *Leontopodium*, *Avena distichophylla*, and *Artemisia mutellina*. Of the rarest species *Draba incana* var. *Thomasii*, *Artemisia spicata*, and *A. glacialis* are found by the Findelen Glacier; *Phyteuma humile* and *Carex hispidula*, on the Riffelhorn; *Lychnis alpina*, *Oxytropis Gaudini*, and *O. lapponica*, *Draba fladnitzensis*, and *Avena subspicata* on the Riffel and Gorner Grat; and *Potentilla multifida*, and *P. ambigua*, *Campanula cenisia*, *Gentiana tenella*, and *Crepis jubata* on the Hörnli. *Scirpus alpinus*, *Carex bicolor*, and *C. rupestris*, are not uncommon.

Before describing the various excursions to be made from Zermatt, a

few words respecting the topography of the district will be useful. It has been remarked in the introduction to this section that the range of Monte Rosa may be considered as formed by the intersection at right angles of two great lines of upheaval. The centre of the cross is formed by a nearly level plateau of considerable extent, and rather over 14,000 ft. above the sea. Reckoning from hence the northern arm includes the *Zumstein Spitze* (15,004'), the *Höchste Spitze** (15,217'), and the *Nord End* (15,132'). These three adjoining pinnacles of the same ridge form the Monte Rosa properly so called, but some writers comprehend as minor peaks of the same mountain the Signal Kuppe and the five highest summits of the southern branch. Beyond the Nord End the northern range rapidly falls by 3,000 ft. to form a ridge about 3 m. in length, and 12,000 ft. in average height. About mid-way the snowy summit of the Cima de Jazi (12,527') rises a little above the general level. N. of this again extends the range bearing the collective name of Saas Grat. It extends for about 10 m. from the *Strahlhorn* (13,750'), through the *Rympfischhorn* (13,790'), *Allaleinhorn* (13,235'), *Alphubel* (13,803'), to the four peaks of the *Mischabelhörner*, all rising between 14,000 and 15,000 ft., and terminating in the *Ulrichshorn* (12,891') and the *Balferin* (12,402').

On the S. side of the central plateau are five summits arranged in descending order—*Parrot Spitze* (14,577'), *Ludwigshöhe* (14,187'), *Schwarzhorn* (14,092'), *Balmenhorn* (13,927'), and *Vincent Pyramide* (13,859'). S. of the latter this range sinks into the comparatively inconsiderable ridge forming the E. boundary of the Val de Lys.

The eastern arm of the cross is formed

* Called on the Swiss Federal Map, Dufour Spitze. With the highest estimate of the services of General Dufour as Director of the admirable Swiss survey, the writer does not believe that the name of any individual can remain permanently attached to the highest peak of the second mountain in Europe.

by the *Signal Kuppe* (14,964'), the *Cima del Pizzo*, and *Cima delle Loccie*, and may perhaps be considered to include the *Pizzo Bianco*.

More important than this is the western arm, including the *Lyskamm* (14,889'), the double summits of the *Zwillinge* (13,879' and 13,432'), *Breithorn* (13,685'), and *Petit Mont Cervin* (12,749'), and connected with the *Matterhorn* and the *Dent d'Hérens* by the flattened ridge, about 11,000 ft. in height, that supports the *Théodule* and *Furgge Glaciers*.

Several secondary ridges parallel to this W. range are connected with the *Cima de Jazi* and the chief summits of the *Saas Grat*, dividing the glaciers that descend towards the *Nicolaithal*. The barrier above spoken of connecting the *Nord End* and the *Strahlhorn* presents a wall of formidable precipices towards the E., but falls away in a gentle slope to the W. For a breadth of nearly 3 m. the upper snow-fields lie almost unbroken upon this slope, but as they begin to descend towards the main valley they are divided into two ice-streams by a ridge which gradually emerges from the *névé*, and finally presents a rather bold front to the glaciers on either side. The highest points of this ridge, appearing insignificant by contrast with the grand objects around, are the *Stockhorn* (11,595'), the *Hochthäligrat* (10,791'), the *Gorner Grat* (10,290'), and the *Riffelhorn*. The western slope, immediately overlooking *Zermatt*, is called the *Riffel*, or *Riffelberg*, and that name is sometimes given collectively to the entire of the ridge. On its S. side is the *Gorner Glacier*, formed by the confluence of all the minor glaciers descending from the N. and W. sides of the *Monte Rosa* range, while on the N. side the *Findelen Glacier* descends near to the village of *Zermatt*. The position of the *Riffel*, surrounded by a complete circuit of peaks of the first order, is unique in the Alps. It forms the starting-point for many of the most interesting excursions to be made from *Zermatt*.

1. *Riffel and Gorner Grat*. Seen from *Zermatt*, the hotel on the *Riffel* appears to stand on the topmost crest of the mountain, because the gentler slopes behind, leading to the *Gorner Grat*, are concealed from view. It is easily reached by a frequented bridle-track in $2\frac{1}{4}$ hrs., but the views, looking backward, are so grand that few accomplish the distance within that time. On the S. side of the village is a bridge over the main stream, just below the junction of the *Findelenbach*. Crossing to the rt. bank, the path ascends amid meadows to the chapel of *Winkelmatten* (5,499'), then traverses the latter stream, and mounts more steeply; before long entering a wood of larch and *Arolla* pine. Where the path forks, keep to the l. following the horse-tracks in doubtful places. At *Schweggmatt*, near some small huts, are some transported blocks left by the ancient glacier, 700 ft. above the present level of the *Visp*. About half-way are the chalets called *Augstkumme*, commanding a noble view of the peaks between the *Matterhorn* and the *Weisshorn*. The side of the mountain is now bare and stony, and the way cannot easily be missed; yet the stranger will do better to keep to the track which winds up the slope, and when this becomes more gentle, reaches the *Riffel Hotel*, one of the highest in Europe, 8,427 ft. above the sea. The accommodation is as good as can fairly be expected, considering that during fine weather the house is constantly crowded, and that travellers arriving late, or starting before daylight for an ascent, are not as considerate as they should be for the rest of their fellow-lodgers.

The main object of ordinary tourists is to reach the summit of the *Gorner Grat* (10,290'). It is easy of access in $1\frac{1}{2}$ hr. from the inn; but those not used to such rough ground should either take a guide or follow the track of some other visitors. After ascending some way, and approaching a little shallow tarn, the traveller finds himself shut out from the view to the rt. by a very steep pinnacle of serpentine rock, called the

Riffelhorn (9,616'). Rising almost vertically from the Gorner Glacier, it commands the finest of all the views of that immense ice-stream; but the panorama is less complete than that from the Gorner Grat. It is accessible from the E. side, but should be attempted only by a practised climber.

Mounting towards the l., amidst huge slabs of gneiss, the Gorner Grat is reached without difficulty, and some persons take horses to the top. As already said, the panorama presents an unequalled circle of Alpine peaks; but in one respect it falls short of the view from the Aeggischhorn, with which it is sometimes compared. The eye does not here plunge down so directly upon the surface of a great glacier. The upper basin of the Gorner Glacier is, indeed, a noble object; but its middle and lower course are, in great part, concealed by the Riffelhorn, and other intervening masses; and of the Findelen Glacier but a small part is within sight. The first impression of the Monte Rosa scarcely corresponds with its great height. As seen from here, none of the summits of the range seem to claim preeminence over the rest; and it was long before their relative claims were settled. The earlier visitors to Zermatt were directed to the Breithorn as the highest part of the range. Long afterwards, the Lyskamm was supposed to be the true summit; and it is so figured in the plates to the 'Études sur les Glaciers,' by M. Agassiz. No description can, however, prepare the traveller for the effect of the opposite portion of the panorama as he turns his eyes round the semicircle from the Matterhorn to the Strahlhorn. The only way to do justice to this scene is to return hither frequently during the spare moments of a traveller's stay at the Riffel.

In fine weather a native speculator is constantly to be found with a basket of food and wine, to tempt the appetite, whetted by the keen, clear air of these Alpine heights. In returning from the Gorner Grat, visitors often take the

opportunity to make nearer acquaintance with the Gorner Glacier. E. of the Riffelhorn, and running along the S. base of the Gorner Grat, is a stony slope, covered with rare Alpine plants, and traversed by a faintly-marked track. This is called the Rotheckumm. The track lies at first many hundred feet above the glacier, but gradually approaches nearer to the ice. The descent is everywhere steep, and rather awkward for ladies, but the glacier is free from difficulty. The traveller will not fail to notice a series of circular pits of considerable size, that recur at about equal intervals on the N. side of the glacier.

In descending from the Gorner Grat tourists often take a course leading NW. to a point called Guggli, overlooking the Findelen Glacier, and there find a path down to Zermatt, along the l. bank of the ravine, through which the Findelen torrent falls to join the Visp. By following a course higher up, over much rough ground, the traveller may cross the Findelen Glacier to the Flüh Alp on its N. bank, and descend thence to Zermatt.

From the Gorner Grat it is tolerably easy to reach the second summit of the Riffelberg, called *Hochthäligrat*. The view is nearly the same; for though this overlooks the Gorner Grat, it is in its turn overtopped by the Stockhorn, and that again by the Cima de Jazi.

2. *The Cima de Jazi*. As already mentioned, this is the highest summit of the ridge connecting the Monte Rosa with the Saas Grat. Although 12,527 ft. in height, it is reached with ease in 4 or 5 hrs. from the Riffel Hotel, excepting after fresh snow, when the excursion becomes very fatiguing, and not to be recommended to ladies. No other summit of the Alps, nearly equal in height, is so completely within the reach of moderate walkers, and so free from difficulty or danger, provided reasonable caution be used. The way from the Riffel Hotel lies through the hollow between the Riffelhorn and the Gorner Grat, and then along the Rotheckumm, keeping to the rocky slope till

the gradual rise of the glacier brings it to the level of the track. After ascending gently for some distance over the ice this becomes crevassed, and it is usual to return to the rocks near the base of the Stockhorn, returning soon after to the *névé* which extends thence to the summit. Although the crevasses are few and far between, the rope should be used, and blue spectacles or a gauze veil, or both combined, should not be omitted. By starting very early there is good chance of finding the snow of the upper glacier firm enough to bear the traveller's weight, and in that case the labour of the ascent is reduced to a mere trifle. It is usual to bear to the l., so as to reach the summit from the NW., where it is least steep. It is now apparent that the ridge laid down in Schlagintweit's map, and copied in many others, supposed to connect the Stockhorn with the Cima de Jazi, is so completely concealed by the *névé*—if, indeed, it really exists—that it is not everywhere easy to distinguish the *névé* of the Gorner Glacier from that which feeds the Findelen Glacier. On approaching the summit it is seen that while the side facing Zermatt has the form of a flattened cone, the Cima itself, and the entire ridge connecting it with Monte Rosa, as well as the E. side of the great mountain itself, form a continuous range of precipices, which for height, breadth, and steepness are unequalled in the Alps, and, perhaps, elsewhere in the world. Travellers are strongly cautioned against approaching too close to the verge, as the cap of frozen snow that covers the summit usually forms a cornice projecting several feet from the rock, and liable, every now and then, to break away and fall some thousands of feet down towards the Macugnaga Glacier. The view includes a great part of the circuit of peaks forming the panorama of the Gorner Grat, seen from a point in the circumference instead of from the centre. In the opposite direction it ranges for an enormous distance over the valley of the Po and the Alpine ranges

that enclose the lakes and valleys of Lombardy. The snowy chain which stretches farthest to the S. is often pointed out as the Ortler Spitze by persons who fancy that they recognise the form of that peak. It is, in fact, the range of the Adamello (§ 44), between the Val Camonica and the Italian Tyrol.

The ascent of the Cima de Jazi may be easily combined with the passage of the Weiss Thor (Rte. F). It is also easy to descend to Zermatt by the Findelen Glacier, ultimately quitting the ice on the rt. bank, where a path over the Flüh Alp leads to Zermatt. The snow fields lying between the summit and Zermatt may be cited in support of the cautions addressed to travellers in the Introduction. Few glaciers are more free from real or apparent danger, for the crevasses are not numerous and the snow covering generally secure. It was on the upper Findelen Glacier that a Russian traveller was lost a few years ago, having been attached to his guides by a rotten rope (worse than none at all), which snapped as he slipped through a crevasse. In the following season one of the best Chamouni guides was very nearly lost in descending from the Cima to the Riffel. It is true that the accident of a snow-bridge giving way may not happen here once in a hundred times; but the insurance against the risk costs so little trouble that it is inexcusable to neglect it.

3. *The Ascent of Monte Rosa.* This is an expedition involving much less labour than the ascent of Mont Blanc; but it is more difficult, and should be attempted only by men thoroughly used to the upper regions of the Alps. The highest summit of Monte Rosa, formerly known at Zermatt as the Gornerhorn, but now generally distinguished as *Höchste Spitze*, is a sharp, jagged edge of mica schist connected by an *arête* with the Nord end, but cut off from the Zumstein Spitze to the S. by nearly vertical rocks about 400 ft. in height. The snows falling on the slope between it and the Nord End form the small *Gornerhorn*

Gletscher, which joins the main Gorner Glacier between two masses of rock that rise on the l. bank. The lower of these is called *Auf der Platte*; the other, lying farther E., bears the name *Ob dem See*, from a small glacier lake which is sometimes found between the rocks and the edge of the glacier, but is often drained through some sub-glacial channel. The earlier attempts to reach the summit were made by the E. side of the Gornerhorn Glacier immediately under the rocks of the Nord End. It is sometimes rather troublesome to force a way through the séracs; but there are no very serious difficulties, and all those who have attempted to do so have reached the saddle which forms the lowest point in the ridge between the *Höchste Spitze* and the Nord End. To the rt. is the sharp and formidably steep crest leading to the summit. The first explorers were deterred by the dangerous appearance of this crest, which is only about 400 ft. above the lowest point of the ridge. It was climbed in 1848 by Johann Madutz, of Matt, Canton Glarus, and Matthäus zum Taugwald, of Zermatt, and again in 1851 by MM. Adolph and Hermann Schlagintweit, with three Zermatt guides; but it was found that the highest peak consists of a double tooth of rock, of which the western, higher by 24 ft., is quite inaccessible from this side.

This highest pinnacle, or *Allerhöchste Spitze*, was reached for the first time in 1855, by Messrs. G. & C. Smyth, Hudson, Birkbeck, and Stevenson, accompanied by Ulrich Lauener, of Lauterbrunnen, and three Zermatt guides. The route taken by them, which has been followed in the numerous subsequent ascents, starts from the rocks of *Auf der Platte*, mounting to SE. by snow-slopes, at first gentle, but ultimately very steep as they abut against a sharp, saw-edged crest of rock that extends about due W. from the *Höchste Spitze*. The passage along this crest constitutes the difficulty of the ascent. On the S. side it overhangs the upper plateau of the Monte Rosa Glacier in a nearly vertical wall

of rock, on the other side an ice-slope of perilous steepness falls away towards the Gornerhorn Glacier. The steadiness and endurance, both of guides and travellers, is tested in the passage of this long crest, especially if, as often happens, a violent wind should be encountered, and the rocks be found coated with a varnish of ice. Veils and spectacles are here discarded, as the utmost caution is required; and, owing to the roughness of the way, and the unequal pace of men who are alternately climbing up or down the teeth of the crest, the rope is laid aside. It is, however, usually called into play at the last, where a mere knife-edge of frozen snow abuts against a slippery face of rock, that leads immediately to the highest peak. In returning along the crest no less care is requisite than in the ascent, but when the upper steep snow-slope is passed the difficulties of the expedition are over. From 11 to 14 hrs. are usually occupied in going and returning from the Riffel Hotel. The most distinctive feature in the view, apart from the vastness of the panorama which it shares with Mont Blanc and several other high peaks, is the extraordinary depth to which the eye plunges directly from the summit, especially towards the Val Anzasca and the basin of the *Macugnaga Glacier*, lying nearly 10,000 ft. below.

Owing to the frequent prevalence of a high wind from the E. or NE., and the slow pace at which it is possible to move when near the top, precautions against cold are more requisite on Monte Rosa than on Mont Blanc. The hands, if not well protected, are soon numbed by the necessity for clinging to the frozen rocks.

4. *Secondary Peaks of Monte Rosa.* None of these is likely to attract much of the attention of mountaineers, and a brief notice will suffice.

The *Nord End* was reached for the first time on the 26th August, 1861, by Sir T. F. and Mr. E. Buxton, and Mr. J. J. Cowell, with Michel Payot, of Chamouni. The *arête* connecting it

with the *Höchste Spitze* is said to be even more difficult than the ascent to the western summit of the latter. It is less uneven, and in great part formed of hard ice, requiring to be cut with the axe. As the summit is 85 ft. lower than its neighbour, and the view, therefore, more limited, it is not likely to attract many visitors.

The *Zumstein Spitze* and *Signal Kuppe* are both accessible without serious difficulty from the Grand Plateau of Monte Rosa. The first named peak was first attained from the S side after three previous unsuccessful attempts by the late Herr Zumstein in 1820. The summit was reached from the Riffel, in 1860, by the Rev. L. Stephen and Mr. R. Liveing. The *Signal Kuppe* was first reached in 1843 by M. Gnifetti, *curé* of Alagna, and for the first time from the N. side, in 1861, by Messrs. Tuckett, C. H. and W. J. Fox. The *Parrot Spitze*, which is nearly 400 ft. lower than the *Signal Kuppe*, is doubtless accessible from the Grand Plateau, though it has not yet been ascended. An active mountaineer may combine a visit to any one of these peaks with the passage of the *Lys Joeh* (Rte. D).

The *Ludwigshöhe* was ascended by M. von Welden, but apparently not by any recent traveller. No account of an ascent of the *Schwarzhorn* or the *Balmenhorn* has reached the editor. The *Vincent Pyramide* was the first conquered of the nine summits of Monte Rosa, having been reached in 1819 by Nicholas Vincent, whose name it bears. Although the lowest of the peaks, this is in one respect the best situated for a view, being that most detached from the main range.

5. The *Lyskamm*. The greatest of the tributary glaciers flowing from the range of Monte Rosa to the Gorner Glacier is that which arises in the central plateau, and falls to the NW. between the *Höchste Spitze* and the *Lyskamm*; it is called, *par excellence*, the *Monte Rosa Gletscher*. This offers the only way yet found to the top of the

Lyskamm. A spirited account of the first ascent is given by the Rev. F. W. Hardy in the second series of 'Peaks, Passes, and Glaciers.' An earlier attempt, by Mr. Tuckett, to reach the same summit from the *Zwillinge Joeh* (Rte. D) was defeated by weather, and by the difficulty of the way. The best way seems to be to mount from 'Auf der Platte,' crossing to the W. side of the Monte Rosa Glacier, under the steep rocks of the *Lyskamm*, nearly to the level of the plateau, then to climb the very steep snow-slopes on the rt. leading up to the ridge, returning along this towards NNW. till the highest point is gained. Owing to the long circuit, and the great number of steps that must be cut in the ice, this requires considerably more time than the ascent of Monte Rosa, or fully 18 hrs.

6. The *Rothhorn*. This excursion may be made either from Zermatt or from the Riffel. There are two summits. The *Ober Rothhorn* (11,214') connected with the *Rympfischwäng*, and the *Unter Rothhorn* (10,191'), somewhat more detached from the range of the Saas Grat, and on that account commanding the finer view. From Zermatt the ascent lies by the rt. bank of the Findelen Bach to the small hamlet of *Findelen* (6,808'). On the slope exposed to the sun, rye and barley are grown at a higher level than has been observed anywhere else in the Alps. A practised mountaineer may find his way alone to the summit of the *Unter Rothhorn*—about 4 hrs. from Zermatt. The view is somewhat similar to that from the Gorner Grat. The summit is farther from the Matterhorn and Monte Rosa, but considerably nearer to the peaks of the Saas Grat. In making this excursion from the Riffel it is better to cross the Findelen Glacier to the *Flüh Alp* (8,464'), and then reach the summit. The ancient moraines which border the glacier and the appearance of the valley below its lower end show that the Findelen Glacier has retired during

the same period in which the Gorner Glacier is known to have advanced considerably.

The two summits here spoken of are not to be confounded with the much higher peak of the Rothhorn, or Moming, NW. of Zermatt.

We now notice excursions that are more conveniently made from the village of Zermatt than from the Riffel.

7. *The Gorner Glacier.* A visit to the lower end of this glacier is within range of an afternoon's stroll from the village.

After flowing due W. for about 6 m. the Gorner Glacier sweeps round the base of the Riffelhorn, and descends nearly due N. into the head of the Nicolaithal. The easiest way lies by the W. bank of the stream for rather more than a mile; then, after crossing the torrent from the Zmutt Glacier, a very picturesque path leads to the ravine through which the Gorner Visp descends from its parent glacier. A wooden bridge leads across the stream and gives easy access to the actual base of the glacier, which has been advancing for a long time past, having shoved before it a bridge and several chalets during the last 10 or 12 years, at the same time ploughing up the pasture land at the side of the stream.

Unpractised visitors should be cautioned against approaching close to the ice, as blocks of stone lightly poised hang on the terminal slope, and from time to time slide with great force down the declivity. The lower slope of the Riffelhorn is steep, but it is possible to mount some way and to observe the process by which the glacier smoothes and polishes the surfaces of rock over which it moves. The appearances may be compared with those seen on the upper ridge of the same mountain in the hollow between the Riffelhorn and the Gorner Grat, where an arm of the glacier passed when the ice rose many hundred feet higher than its present level. The pinnacles of ice formed in the steep part of the descent of the glacier cannot fail to excite admiration. They are

quite equal to those seen near Chamouni.

8. *The Schwarz See and Hörnli.* This is deservedly one of the excursions most often made by strangers. It is possible to ride as far as the lake.

From the very base of the E. face of the Matterhorn a nearly level ridge or promontory of rock extends a little N. of E., terminating abruptly in a bold point conspicuous from Zermatt, called the *Hörnli* (9,492'). In the angle between this and the higher ridge connecting the Matterhorn with the Breit-horn is formed the *Furgge Glacier*. Below the Hörnli the ridge separating the torrent of this latter glacier from that of Zmutt spreads out, and in one of its undulations forms the basin of a small lake or tarn, called *Schwarz See*, with a solitary chapel beside it, 8,393 ft. above the sea. In the ascent is one of the finest views of the Gorner Glacier here seen while undergoing the process of rapid flexure, at the same time that it falls rapidly round the base of the Riffelhorn, with its surface torn by various systems of crevasses which finally intersect each other, forming a wild confusion of tottering pinnacles of ice. The view from the Schwarz See well rewards the ascent, but those who do not object to a short and sharp climb should ascend the Hörnli. Nowhere perhaps does the *Matterhorn* appear more overpoweringly grand than from this point. Other peaks, such as some of the Chamouni aiguilles, may appear as bold in outline, but they want the air of solidity peculiar to this unmatched peak. With an audacity that seems to defy the universe, it rears its front 5,000 ft. above the snow-fields at its base, as though its massive framework could support the shock of a world in ruins. Its stability is but apparent. Those who have all but succeeded in climbing this hitherto unconquered peak, and have passed successive nights on the ledges of its SW. shoulder, have witnessed the continued progress of destruction that, stone by stone, is un-

building the marvellous structure; though it is not yet possible to calculate how many millions of ages would be required to bring it down to the level of the lower ridges that surround its base.

There is no difficulty in following the ridge from the Hörnli to the actual base of the great mountain. In descending, it is usual to bear to the l., so as to include with the excursion a visit to the lower end of the Zmutt Glacier. In returning that way, a remarkable chasm, cut through the rock by the Zmutt torrent, well deserves attention. It is crossed by a bridge over which a path leads to the hamlet of *Zmutt* (6,365'), the largest of those above Zermatt. (See § 19, Rte. D.)

9. *The Mettelnhorn.* The Mettelnhorn (11,188') is the highest point of a promontory extending eastward from the Rothhorn, or Moming, and immediately overlooking the village of Zermatt. It commands one of the finest—some think the very finest—view in this neighbourhood, distinguished from the others of the same class by its near neighbourhood to the noble peak of the Weisshorn, and by including a considerable portion of the Bernese Alps, in the opening between that peak and the Mischabelhörner. The ascent is a stiff climb of from 4 to 5 hrs., exclusive of halts, but is within the reach of an average mountaineer. To reach the summit is rather too severe an exertion for ladies; but the view from a point overlooking the Schallenberg Glacier, about 1 hr. below the top, is nearly equally fine, and avoids the most troublesome part of the ascent.

The most direct way commences from the village of Zermatt, opposite the door of the Hôtel du Mont Cervin, up the face of a rocky slope. This is extremely steep for $1\frac{1}{2}$ hr. It is usual to take an easier course by a track which mounts at first obliquely to the N., and then bears to the l. until a view of the Trift Glacier is opened, when the ascent continues direct to the summit. The last part, for about 1 hr.,

is very steep, in part over a snow-slope, and in part over débris often mixed with loose snow. This is the best point for a view of the *Schallenberg Glacier*, which fills a considerable hollow between the Weisshorn and the *Moming*. This latter fine peak (13,855') is one of the few near Zermatt which has not been attacked by the members of the Alpine Club. The summit appears very steep.

10. *The Weisshorn.* This is, perhaps, the most beautifully sharp and symmetrical of the pyramidal peaks of the Alps, and the ascent may be counted amongst the most difficult and laborious that have been yet achieved. It is formed by the intersection of a main N. & S. ridge, with a ridge, or arête, that descends on the E. side towards Randa. The NE. and SE. faces of the pyramid, as well as the upper parts of the three ridges leading to the top, are mainly formed of hard frozen snow. On the W. side the pyramid is broken away, and displays those vast precipices that present so grand an aspect from the heights above Zinal. At first sight, it is not easy to guess which of the three arêtes may be least difficult; but as two attempts by the northern one, though made by first-rate mountaineers, have both failed, it may be assumed that that route is impracticable. The S. arête has been condemned by very competent judges, and the only two successful attempts have been made by the E. arête, approached from the *Schallenberg Glacier*, one branch of which lies in the angle between this and the S. ridge. It remains to be tried whether the approach may not more advantageously be made from the *Bies Glacier*, lying in the NE. angle of the mountain. The honour of achieving the first ascent fell to that eminent mountaineer, Professor Tyndall, whose genial little volume, 'Mountaineering in 1861,' contains a narrative of the expedition.

Accompanied by J. J. Bennen, of Laax, and Ulrich Wenger, of Grindelwald, Mr. Tyndall bivouacked at over 9,000 ft.

above the sea, and reached the highest peak on the following day in 10 hrs. of severe exertion. The return was found to be not much less difficult than the ascent; and they regained Randa at 11 P.M., after about 20 hrs. of almost constant hard work. The second, and only other ascent, was accomplished in 1862 by the Rev. L. Stephen. Starting with Melchior Anderegg and Franz Biener, of Zermatt, from a chalet below the Schallenberg Alp, nearly 2 hrs. lower than Mr. Tyndall's bivouac, that indefatigable walker gained the highest point in $9\frac{1}{2}$ hrs., and returned to Randa in $7\frac{1}{2}$ hrs. more, reaching Zermatt the same night.

The lower two-thirds of the E. arête are formed of successive teeth of rock which start out of steep snow-slopes, seamed by couloirs of ice. It has hitherto been found best to keep to the base of these projecting rocks, passing one after the other along their S. face, and Mr. Tyndall appears to have lost some time by attempting to make his way along the snow-slopes below them, where the ice-couloirs were found extremely troublesome, and the attempt was abandoned. The snow-arête leading from the upper rocks to the topmost pinnacle appears to be perilously sharp, and during some portion of the way the snow slope on the l. ends abruptly at the edge of precipices, of which Mr. Stephen says, 'I have never seen more fearful cliffs.' The summit has been found to be a solid angle of frozen snow, ending literally in a point, with the sides corresponding to the three faces of the mountain. The height of the Weisshorn has been determined trigonometrically to be 14,804 ft., and therefore a little below that of its rival next noticed.

11. *The Dom.* Next to Monte Rosa, the Saas Grat is, of all the ranges in the Alps, that which maintains the highest continuous elevation, and presents the greatest number of lofty summits. The highest part of this range is formed by four peaks, arranged nearly in line, and about equidistant, called the

Mischabelhörner. Reckoning from S. to N., these are as follows:—

	Feet
Täschhorn	14,758
Dom or Grabenhorn	14,935
Mischabel No. 3. (nameless)	14,108
Gasenriedhorn	14,219

The differences of height are not so great but that one or other appears to be the highest, according to the point from which they are viewed. The true summit, called Grabenhorn in the Nicolaithal, is a beautiful and very sharp snow-pyramid, broken away irregularly on the E. side towards Saas, whence it appears as a double-pointed peak, through some effect of perspective bringing a lower point nearly into a line with the top. The two N. peaks are sometimes distinguished as the Nadelgrat, and the northern of the two—the Gasenriedhorn—which is not seen from Saas, nor from Fée, but from a point near the little chapel between these places (Rte. N), passed at Saas for the Dom, or highest summit of the ridge. This was apparently the point reached by Mr. Chapman, ascending from Saas, in 1856, but neither on that occasion, nor in the course of various attempts made by the well-known mountaineer, M. Imseng, curé of Saas, has the Dom been reached from that side.

The first successful ascent was made by the Rev. J. Hlewellyn Davies, with Johann zum Taugwald and J. Kronig, of Zermatt, and a young man of Randa, who volunteered to accompany them. (See 'Peaks, Passes, and Glaciers,' first series.) Starting from Randa, and mounting about due E. to the highest pastures, the ascent is a continuous climb—steep, but nowhere very difficult. The only side by which the summit is accessible is by the NW. angle, between the ridge connecting it with the Nadelgrat and a western spur that descends between Randa and Täsch. From the snows accumulating in this angle, two glaciers descend towards the Visp—the *Graben Glacier*, whose torrent flows past the village of

Randa, and the *Hohberg Glacier*, at first descending NW. and then bending to W. parallel to the Graben Glacier, and separated by a ridge which, on some maps, is wrongly laid down as if it were continued to the head of both glaciers and connected with the Nadelgrat. After ascending more than 4 hrs. from Randa, Mr. Davies found himself on the N. bank of the Graben Glacier, which he then traversed diagonally, without encountering many crevasses, towards some rocks which form the base of the proper peak of the Dom. The climb from thence to the top is long and steep, in part over rocks, and partly by snow-slopes. Towards the top it is necessary to follow the W. arête, which on the S. side falls away in a sheer precipice towards Zermatt. The summit was reached in less than 9 hrs., including a halt for breakfast. Mr. Leslie Stephen, who made the second ascent, with Mr. Liveing and two guides, Melchior Anderegg and Johann zum Taugwald, allows 8 hrs. for the ascent. The view is considered by Mr. Stephen 'the very finest in the Alps, including, besides nearly every Swiss mountain, the Lago Maggiore, the Lake of Geneva (as I believe), and the glorious precipices above the Fée Glacier.'

The vertical height of the Dom above Randa is just 10,000 ft., and the distance in a straight line little over 4 m. This is, therefore, the longest and steepest continuous ascent yet made in the Alps. Thorough training is requisite for the mountaineer who would undertake it; but it does not appear to involve any unusual difficulties. The descent may be accomplished in little more than 4 hrs.

It is to be noted that the map in the first series of 'Peaks, Passes, and Glaciers' tends to mislead those who rely on its accuracy. Nearly the whole ascent is made by the rocks on the E. hand, or N. side of the Graben Glacier, and it is only at the base of the final peak that this is crossed towards the SE.

12. The *Täschhorn*. The first ascent

of this twin-brother of the Dom was made on July 31, 1862, by the Rev. J. Ll. Davies and the Rev. J. W. Hayward, with Johann and Stephan zum Taugwald as guides. Starting at 2 A.M., they mounted through the forest to the *Kien Glacier*, and then took a nearly direct course to the top. The upper slope, which was ascended by zigzags, is extremely steep, and it was a matter of great difficulty to pass from the snow to the rim of rocks that crown the peak. The view scarcely differs from that gained from the Dom, but this is more difficult of access. The summit was gained at 1.50 P.M., and the return to Randa was not effected till 10.15 P.M.

13. The *Rympfischhorn*. This fine peak, 13,790 ft. in height, lies between the Allalein and Adler passes described in Rte. O. It is not, however, accessible from either of them, and must be made the object of a distinct expedition from Zermatt or the Riffel. Though higher by 40 ft. than the Strahlhorn (Rte. O), it seems that the latter has the advantage of a position more immediately overlooking the adjoining valleys of Piedmont. It is certain that they both command panoramic views of the grandest character.

The editor has received a brief notice of the first ascent from the Rev. L. Stephen, whose name so frequently recurs among the explorers of this district. The ascent, which is described as comparatively easy, was made by the *Rympfischwäng*, a steep and lofty ridge extending westward from the peak, and separating the Täsch and Findelen Glaciers. Passing along the ridge, which commands noble views, the traveller should ascend the most southerly of the rocky ribs or arêtes that converge towards the summit. The highest point is the termination of the next arête, but when the first has been climbed there is no difficulty in reaching the true summit. Time, 7 hrs. from Zermatt to the top; descent about 5 hrs. Guides: Melchior Anderegg and Johann zum Taugwald.

Several other excursions from Zer-

matt are described in connection with routes included in this and the last section. Some of these should not be omitted by travellers who may not intend to cross the passes with which they are connected. Of these may be particularly mentioned the excursion to the Col de St. Théodule, which the mountaineer may combine with the ascent of the Breithorn or the Petit Mont Cervin (Rte. B). The ascent of the Strahlhorn is one of the most interesting; but for those who do not cross the Adler Pass (Rte. O), it is more easily made from the Mattmark See. The ascent to the Trift Joch and that of the Ebihorn (§ 19, Rtes. E and F), are extremely interesting expeditions. If it be possible to pass from the Trift to the Arbe Glacier, between the *Ober Gabelhorn* (13,363'), and the *Unter Gabelhorn* (11,149'), returning to Zermatt by the lower end of the Zmutt Glacier, the expedition would include many of the noblest views in this neighbourhood. The writer has enjoyed a considerable portion of the same grand scenery in a shorter excursion, wherein, after ascending the Trift, he climbed the shoulder of the Unter Gabelhorn, and then descended by a very steep way near to the foot of the Zmutt Glacier.

ROUTE B.

ZERMATT TO IVREA, BY THE VAL TOURNANCHE—COL DE ST. THÉODULE—BREITHORN—MATTERHORN.

	Hrs.' walking	Eng. miles
Col de St. Théodule	4	9
Breuil	$2\frac{1}{3}$	6
Val Tournanche	2	6
Châillon	$2\frac{1}{2}$	10
Donnaz	$4\frac{1}{2}$	15
Ivrea	$3\frac{3}{4}$	$12\frac{1}{2}$
	$20\frac{1}{2}$	$58\frac{1}{2}$

The *Col de St. Théodule* is one of the most frequented, and, in fine

weather, one of the easiest glacier passes in the Alps. At certain times mules may be taken across, but the charge (40 fr. to Val Tournanche) is high, and only excused by the uncertainty attending the return to Zermatt. Ladies who can walk a moderate distance may ride part of the way, sometimes quite to the top of the pass, and secure mules or horses to meet them at the foot of the glacier, by writing beforehand to the innkeeper at Breuil. In settled weather mountaineers travelling two or more together do not require a guide, but are strongly advised not to neglect the use of the rope. Concealed crevasses rarely occur on the line usually taken by the guides, but are plentiful in some parts of the glaciers on either side, and several fatal accidents from this cause are recorded. In cloudy weather it is very easy to lose the true direction, and strangers may soon get involved in serious difficulties. The time required for the passage depends on the state of the snow. Ascending from Zermatt, $4\frac{1}{2}$ or 5 hrs. generally suffice, and 3 hrs. for the descent on the same side. From the top to Breuil 2 hrs., or 3 hrs. ascending from Breuil, is a fair average. In starting from the Riffel Hotel, about $\frac{1}{2}$ hr. may be saved in the ascent, but it is not prudent to attempt it without a guide. Owing to the roughness of the way, no time is saved by going from the col to the Riffel instead of descending to Zermatt.

After crossing the torrent from the Zmutt Glacier, about a mile from the village the track mounts amid meadows and hay-sheds on the W. side of the Gorner Glacier. Some arolla pines (*P. Cembra*) are passed, and the slope becomes steeper as the *Garbach*, a torrent descending from the Furgge Glacier, crosses the track. The way now becomes rough and difficult for mules, especially when a stiff ascent has led to the verge of the glacier amid loose scattered slabs of gneiss. The ascent over the *Théodule Glacier* is rather fatiguing when covered with

soft snow, and it is therefore desirable to pass as early as possible in the day, but it is in great part free from crevasses. Persons who, in descending from the col, have wandered too much to the l. on this glacier have, however, encountered unexpected difficulties. After $\frac{1}{2}$ hr. it is usual to leave the glacier for a ridge of low projecting rocks, returning before long to the *névé* which leads in about $\frac{3}{4}$ hr. to the top of the pass, 10,899 ft. above the sea. It may be counted as the highest frequented pass in Europe, though from thirty to forty passes mentioned in this work deprive it of the distinction still claimed for it as the highest in the Alps. A small hut, occupied in summer by a man who offers refreshment to travellers, has been erected on the small patch of bare rock that marks the crest of the ridge, nearly on the site where Saussure passed three days in a temporary shed. The *Théodulhorn* (11,391'), W. of the pass, does not command a much wider view than that which is already found here, grand enough to satisfy most travellers. The mountaineer who seeks a wider horizon may gratify his taste by mounting the *Petit Mont Cervin* or the *Breithorn*, and some have accomplished both ascents on the same day.

The *Breithorn* (13,685') is the massive, nearly flat-topped mountain forming the W. termination of the chain of Monte Rosa. On the N. side it presents ranges of dark rocks rising above steep snow-slopes. On the S. side it is comparatively easy of access, by a continuous slope of moderate inclination, but the snow, exposed to the southern sun, is often soft, and therefore fatiguing to the climber. The first recorded ascent was by the late Lord Minto, one of the earliest explorers of this district, and the next by our eminent living countryman, Sir John Herschel.

The *Petit Mont Cervin* (12,749') is a detached peak of bold form, lying a little S. of the ridge connecting the *Breithorn* with the Col de St. Théodule, and this with the *Matterhorn*.

This is also most easily reached from the S. side. The way from the col to the *Breithorn* passes to the S. of the *Petit Mont Cervin*. With the snow in very favourable condition, the top of the *Breithorn* has been reached in 2 hrs. 20 min. from the pass, but a much longer time is generally employed.

The name *Matterhorn* is retained in this work because it is the vernacular name in the valley where the mountain is chiefly seen and approached by travellers. In the Val d'Aosta and the Val Tournanche it is called *Mont Cervin*. Some Italian writers use the name *Monte Silvio*, but this does not seem to be adopted anywhere in the neighbouring valleys.

The descent from the Col de St. Théodule lies for rather more than $\frac{1}{2}$ hr. over glacier. On the rt., about 500 ft. below the summit, are seen the traces of a redoubt long ago thrown up by the Swiss to defend this entrance into their territory. At the foot of the glacier a steep slope of scattered rocks, called *Les Fourneaux*, leads down to the highest pastures, and then an easy descent leads in 2 hrs., or little more, from the col to *Breuil* (6,566'), where travellers formerly found shelter in a rude *châlet*, but are now received at one of the most comfortable of Alpine inns. The *cuisine* is said to be particularly good. This affords excellent head-quarters for one who would explore the neighbouring scenery, and has been the starting-point for several attempts, at last nearly crowned by success, to scale the summit of the *Matterhorn*. After the failure of efforts in which the best mountaineers have pushed daring to the verge of temerity, it is allowable to believe that this, perhaps alone among the great peaks of the Alps, will preserve the epithet 'inaccessible.'

The first serious attempt, made in 1860, is recounted by Mr. F. Vaughan Hawkins in the first volume of 'Vacation Tourists.' The party consisted, besides Mr. Hawkins, of Professor Tyndall, with J. J. Bennen, of Laax, and a good local mountaineer, named

Carrel, as porter. Leaving Breuil at 3 A.M., they reached in 5½ hrs. a gap in the ridge connecting the Matterhorn with the Dent d'Hérens. This might possibly serve as a pass from the Zmutt Glacier to Breuil, but the rocks on the N. side are perilously steep. E. of the gap rise the formidable battlements of the Matterhorn. Two buttresses of rock, divided by an ice-couloir, but seemingly united at the top, connect this part of the ridge with the topmost tower-shaped summit of the mountain. 3 hrs. of very difficult climbing over rocks made slippery by a varnish of ice did not suffice to reach the summit of the l. hand buttress, forming the watershed between Zmutt and Breuil. In 1862, Mr. Whympier, with great boldness and perseverance, made several attempts, which were carried higher on the same ridge, and were terminated by an accident, in which that gentleman had an extraordinary escape from destruction. Later in the same season, Professor Tyndall returned with Bennen and another guide, and on this occasion overcame all the difficulties that had seemed so formidable from below; but at a point a few hundred ft. below the summit they were arrested by faces of rock that defied their utmost efforts. In returning they were forced to let themselves down the rocks by a rope, which probably still remains attached to a pole thrust into a crevice.

It has been suggested that the hitherto untouched peak of the Dent d'Hérens (13,714') might be reached by Breuil, but the editor has not heard of the attempt having been actually made.

Breuil is an excellent station for the botanist, who, among other rare Alpine plants, may here find *Saponaria lutea*, *Silene vallesia*, *Trifolium saxatile*, *Potentilla norvegica*, and *P. nivea*.

The grand peaks surrounding the head of the Val Tournanche, and the huge blocks that are scattered on the lower slopes, give an air of extraordinary wildness to the scenery. The track below Breuil soon enters a

ravine, and is carried along a steep slope of rock to the little chapel of Notre Dame de la Garde, about 3½ m. After a steep descent the stream is crossed, and the path lies on the rt. bank until, after returning to the E. side, a short ascent leads to

Val Tournanche (5,057'), the highest village in the valley. The village inn affords tolerable quarters, but very inferior to those at Breuil. Antoine Pession is a good guide for the ascent of the Breithorn and the passes at the head of the valley. [For the pass to the Val Pellina by the Col de Vacornère, see § 18, Rte. I.] The view down the valley, closed by a distant peak of the Cogne mountains, is extremely fine. A steep descent leads from the village to the bridge, after which the track is carried nearly all the way along the rt. bank amidst very beautiful scenery. 'The valley is green and usually shaded with noble chestnuts and walnut trees; below foams the torrent, above on each side are tremendous rocks and precipices, and the Mont Cervin is frequently in view. About an hour below Val Tournanche some extraordinary remains of a Roman aqueduct may be seen high up on the face of the rock on the rt., and they are continued at intervals for several miles. The finest portion consists of several arches, very perfect, hanging like a picture against a nearly perpendicular cliff several hundred feet above the valley, nearly opposite the village of *Antey*. The road continues on the rt. bank for nearly 2 hrs., then crosses for about 10 min., and returns to the rt. bank for the rest of the way to Châtillon. The mule-track for the last 2 m. rises high above the stream, but pedestrians can find paths close to the stream and through green and shady meadows till close to Châtillon. This part of the valley is fearfully hot in summer, and should be passed early in the morning or late in the evening.'—[M.]

Those who are bound from Zermatt to the valley of Ayas may combine the finest part of the scenery of Val Tour-

nanche with a tolerably direct route to the former valley, by crossing the *Col de Portola* from Antey to Ayas (Rte. H).

Châtillon (Inns: Palais Royal, tolerably good; Lion d'Or) is a large village (1,690'), on the high route from Aosta to Ivrea, about 15 m. from the former city (see Rte. I), at the junction of the Val Tournanche with the Val d'Aosta. The chief objects of interest are the bridges. A Roman arch, still standing, is surmounted by a later bridge, which in its turn was superseded by the modern structure, a single arch boldly thrown across at a great height above the stream. Several ruined châteaux on the heights above the valley add to the picturesqueness of this part of the Val d'Aosta. An active walker starting very early from Zermatt may reach Châtillon in 11 hrs. exclusive of halts, in time to hire a vehicle, which will carry him down to Ivrea on the same evening in about $4\frac{1}{2}$ hrs. Few will wish to walk, as the way is extremely hot and dusty.

At *St. Vincent*, $1\frac{1}{2}$ m. below Châtillon, are some mineral baths and two inns (Écu de France; Lion d'Or) said to be pretty well kept. This place, surrounded by magnificent chestnut and walnut trees, is the pleasantest spot for a halt between Aosta and Ivrea. Here turns off the mule-path to Gressonay, described in Rte. I. The Dora Baltea, which had flowed about due E. for 25 m., now turns to SSE. The Pont des Sarasins, a picturesque bridge over a ravine, commands a last and beautiful view to the W., and the road enters a defile amidst syenite rocks, here interposed between the palæozoic schists of the head of the valley and a zone of gneiss stretching from the S. side of the Graian chain to the head of the Val Sesia.

The ruined castle of *St. Germain* surmounts the rocks which command the defile. At its S. end the valley widens out, and about 9 m. from Châtillon reaches

Verrex (Inns: Écu de France, extortionate; Couronne), a thriving

village (1,280') at the junction of the *Val Challant* (Rte. C) with the main valley. The old tower of the castle of Challant belonging to the former lords of this district commands a noble view. The road continues to descend through a straight and narrow stretch of the valley to *Bard*, a poor village at the junction of the Val Champorcher (§ 14, Rte. D), with a mean and dirty inn (Sole), famous for its fort, which in 1800 all but changed the destinies of Europe, by barring the passage of the valley to the French army under Napoleon. It has been greatly strengthened, and is now supposed to be impregnable. About a mile lower down is *Donnaz*, reached through a narrow pass where the road overhangs the river. A cutting through the live rock, of Roman work, retains the measurement, reckoned probably from Aosta, xxxii. M.P. About 1 m. more of rather rapid descent leads to

Pont St. Martin (Inn: Rosa Rossa, tolerably good), one of the most beautiful places in the valley, at the junction of the Lys, descending from the glaciers of Monte Rosa. The road crosses a modern bridge near to a lofty Roman arch, which still serves for one of the paths leading up the Val de Lys (Rte. D). At this point the Dora may be said to issue from the Alps, and the Val d'Aosta, no longer hemmed in between lofty ranges, widens out with a nearly level floor between the hills that gradually subside into the plain of Piedmont. The language undergoes a corresponding change, and the rude French dialect spoken in the Val d'Aosta and the tributary valleys above St. Martin gives place to an equally rude Italian dialect, characteristic of the province of Novara. The cultivation rapidly changes its character, and the mulberry takes the place of the chestnut, as the road, after passing under the castle of *Montaldo*, and past *Settimo Vittone*, lies at some distance from the Dora, traversing the rich flat that terminates at the walls of

Ivrea (Inns: Europa, the largest—

many complaints of bad accommodation and high charges; Lion d'Or, very fair), a rather large town, 768 ft. above the sea. The old castle, now a prison, has an imposing appearance, and the entrance from the S. by a fine bridge over the Dora is highly picturesque. The geologist should not fail to examine the hills, which appear to enclose the mouth of the valley below the town. They are the gigantic moraines of a glacier which once united the separate ice-streams that flowed from each lateral valley of the Pennine and Graian Alps, into the Val d'Aosta.

Ivrea being now connected by rly. with Turin (2 hrs. 10 m.), and with Novara (3 hrs., or more, owing to delay at Chivasso), a traveller starting by the first train may with great ease reach, in a single day, almost any of the valleys of the Piedmontese or Lombard Alps. If his aim be some remoter point, he may sleep on the same night at Venice or Bologna, or reach Genoa in time for the evening steamer to Leghorn, or, after spending the day in Turin, he may be in Paris on the morning of the day next but one following.

ROUTE C.

ZERMATT TO VERREX, BY THE SCHWARZ THOR AND THE VAL D'AYAS.

It has been a difficult matter to decide how the valleys radiating from the S. and E. sides of the range of Monte Rosa, and the passes connected with them, may most conveniently be described. Until lately travellers, selecting either the higher passes nearest the central mass, or those more distant and rather easier, made either partially or completely the circuit of the entire group included in the present section. But since the number of

known passes between the adjoining valleys has been largely increased, and mountaineers have found their way across the range of Monte Rosa from Zermatt to the head of each of the four principal valleys, over what was long deemed an impassable barrier, the number of possible routes open to future visitors is multiplied to an extent rather inconvenient to the writer of a guide-book. In this, and the three following routes, the direct passes leading from Zermatt, and the course down each valley to its lower extremity, are described, while in the subsequent routes are included most of the passes lying in the circuit round the S. and E. sides of the range. As the passes across the range of Monte Rosa are the highest known in the Alps, there is a manifest advantage in taking them from the Riffel Hotel, except in the case of the Sesia Joch, as yet so little known that it is more prudent to attempt the ascent from the Val Sesia side.

It has been already observed that the long, nearly flat-topped ridge of the Breithorn presents towards Zermatt and the Gorner Glacier ranges of seemingly impracticable rocks. On its E. side it is separated from the broken masses of rock and ice that descend from the Zwillinge towards the Gorner Glacier by the *Schwärze Glacier*, expanding gradually in width as it descends from the summit of the ridge, and usually broken into a giant staircase by broad parallel transverse crevasses. This is bordered on one side by a range of nearly vertical rocks facing a little N. of E., at first very lofty, but diminishing in height as the glacier towards its source approaches the level of the ridge. At the head of the glacier is a small gently sloping plateau between the last rocks of the Breithorn and the NW. summit of the Zwillinge, fancifully called *Pollux*. This forms the pass of the *Schwarz Thor*, first traversed in 1845 by the editor of this volume, and described by him in the first series of 'Peaks, Passes, and Glaciers.' It is probable

that with more experience than he then possessed, the difficulties described in that work might have been in great part avoided. It is an illustration of the varying nature of glaciers, that while others who have crossed the pass have met more or less of difficulty among the séracs on the E. side of the glacier, the Rev. Leslie Stephen found the crevasses closed in 1861, and was able to run without interruption from the top to the level of the Gorner Glacier. The height, as determined by a boiling-water observation of Sir T. F. Buxton, is 12,777 ft., closely agreeing with the writer's estimate. From the actual col, the view to the N., including the Bernese Oberland, and the nearer masses of the Weisshorn and the Saas Grat, is shut out by the last rocks of the Breithorn, and should be seen a short way before reaching the summit. It appears that the summit of *Pollux* (13,432') might be easily reached from the col.

On the S. side it is necessary to keep to the rt. along the base of the Breithorn rocks, which rise but little above the level of the col, passing quickly, as blocks of ice are sometimes detached from the topmost ledge. The descent over the upper glacier of Ayas is steep but quite free from difficulty, until after coming down about 3,000 ft. a projecting barrier of rock splits the glacier into numerous crevasses. These are avoided by bearing to the l., and ascending slightly, whereby the traveller reaches a ridge of rock dividing the two lower branches of the Ayas Glacier. These are apparently distinguished on most of the maps by the names *Ayas Glacier* and *Verra Glacier*; they are not, however, distinct streams. It is easy to descend to and cross the E. branch, or *Verra Glacier*, and near its foot, a hut, occupied by a herdsman for a few weeks in summer, is the first token of the presence of man since leaving the Riffel Hotel. Nearly an hour's walk along the torrent is required to reach the hamlet

of *San Giacomo d'Ayas*, where a little mountain inn with four beds has lately been opened. This will greatly facilitate the exploration of the neighbouring glaciers, which do not appear to have been as yet correctly laid down on any map.

The upper part of the valley into which the traveller has descended is called *Val d'Ayas*. Not to speak of minor tributaries, it unites two main glacier torrents—that from the *Aventina Glacier*, lying on the S. slopes of the Breithorn, and that from the Ayas Glacier by which the traveller has descended from the Schwarz Thor. The united stream is called *Evanson*.

The people of this valley speak a patois which approaches to, but seems different from, the French dialect of the Val d'Aosta. Owing to the want of decent accommodation, travellers have hurried rapidly through beautiful scenery which would certainly reward a closer exploration than it has yet received. It is a walk of 3 hrs. from S. Giacomo, passing about half-way the village of *Ayas*, and the vestiges of a lake formed by a great landslip, to *Brussone*, a finely situated village, now possessing a good mountain inn (Lion d'Or). It lies on the most frequented route from Aosta to Gressonay. The various passes leading into the valley are described in Rtes. G, H, and I.

Below Brussone the valley is called *Val Challant*. Following the track along the stream, a walk of 3 hrs. leads the traveller to *Verrex* (see last Rte.). The scenery continues throughout very beautiful, but the way is very hot, and the inhabitants are afflicted with goitre and cretinism to a painful extent.

ROUTE D.

ZERMATT TO PONT ST. MARTIN, BY
THE LYS JOCH, OR ZWILLINGE
JOCH, AND THE VAL DE LYS.

Before the establishment of the hotel on the Riffel, the idea of attempting a pass across the central and highest part of the range of Monte Rosa, direct from Zermatt to Gressonay in the Val de Lys, had occurred to some mountaineers, but the great distance to be traversed, the unusual height of the pass, and the uncertainty as to the means of returning in case of failure, were so many discouragements to the attempt. It was not until 1859 that the pass across the Grand Plateau of Monte Rosa was to be shown not only practicable, but in fine weather free from serious difficulty. Although more than 14,000 ft. in height, it is not, when taken from the Riffel, more laborious than many other snow-passes. In 1861 another pass was effected between the Lys and Gorner Glaciers, passing between the Lyskamm and Castor, the E. summit of the Zwillinge. Though lower, this is a more difficult pass than the other, and less likely to come into general use. The merit of having been the first to open these routes, so full of interest to all Alpine travellers, is mainly due to Mr. W. Mathews, junr., and may be reckoned amongst the most useful achievements of that excellent mountaineer.

1. *The Lys Joch, or Silber Pass.* By one or other name the pass over the Grand Plateau of Monte Rosa is known at Zermatt and Gressonay. The way to the summit is clearly seen from the Gorner Grat or the Rothe Kumm. It lies by the Monte Rosa Gletscher, which (Rte. A) descends to join the Gorner Glacier between the rocks of Auf der Platte and those of the Lyskamm. Several of the best Zermatt and other guides are now acquainted with the pass, which may be made from the Riffel to Gressonay in 10 or 11 hrs., exclusive of halts, and presents no un-

usual difficulty, but it would be extremely laborious if the snow happened to be soft. It is therefore desirable to start before daylight, so as to make a part of the ascent before the sun has begun to tell on the surface.

After crossing the Gorner Glacier, it is possible to ascend by the mid-channel of the Monte Rosa Glacier, but, as the crevasses are numerous and difficult near the junction of the two streams, it is better to follow the ordinary route to Monte Rosa as far as 'Auf der Platte' before diverging into the great valley which separates Monte Rosa from the Lyskamm. In 5 or 6 hrs. from the Riffel the traveller may reach the Grand Plateau, a nearly level tract more than 1 m. across, and higher than the summit of the Finster Aarhorn, around which the highest peaks of the range rise as low hills of snow broken by projecting rocks. The pass lies across the ridge which forms the southern boundary of the plateau, and connects the Lyskamm and the Parrot Spitze. There appear to be two cols, separated from each other by a low dome of snow, but that nearer the Lyskamm is usually divided from the Plateau by an impassable bergschrund, so that it is necessary to effect the passage by the opening on the left, between the snow-dome and the Parrot Spitze. This is the Lys Joch, elevated 14,040 ft. above the sea, according to the observations of Mr. Tuckett. On arriving at this point the traveller looks down upon the great plain of Piedmont, enclosed by the Ligurian Apennine and the curving line of the Maritime and Cottian Alps, from which, at a distance of nearly 100 m., rises the noble pinnacle of Monte Viso. In the immediate foreground is the eastern arm of the Lys Glacier, bounded on the rt. by a long spur of the Lyskamm, and on the l. by the line of peaks from the Ludwigshöhe to the Vincent Pyramide. In $1\frac{1}{2}$ hr. the descent is made without difficulty on the eastern side of the glacier to the northern foot of the *Hohes Licht* (11,633'), a rocky peak below the

Vincent Pyramide, with which it is connected by a low snow-ridge dividing the Lys Glacier from that of Garstelet.

A few yards distant is a ruined miner's cabin (10,784'), used as a camping-place by the earlier explorers of Monte Rosa, in some of their attempts to ascend the mountain from the S. From the foot of the Hohes Licht there is an extensive and beautiful view to the westward, where Mont Blanc is seen at the head of the Val d'Aosta, flanked by many of the Graian and Pennine Alps. A still more extensive panorama might probably be obtained by climbing to the summit of the peak itself. Looking southward, the *Lys Glacier* is seen on the rt., occupying the deep hollow between the Hohes Licht and the Felikhorn. It is formed by the union of two main streams — the eastern, flowing down from the ridge which connects Monte Rosa with the Lyskamm, the western from that which connects the Lyskamm with the Twins. The two arms are divided from each other by the great southern buttress of the Lyskamm, which terminates in a steep rocky promontory called the *Nase*. The base of this is 11,155' above the sea, and the highest of its peaks, of which there appear to be three, 11,910'. [The Nase is most easily reached from the E. side by crossing the glacier from the Hohes Licht. Both are easily combined in an excursion from Gressonay. Notwithstanding its great height, the Nase produces several species of flowering plants.]

The descent from the Hohes Licht presents little difficulty. Easy snow-slopes on the E. side of the peak terminate in a series of gently inclined surfaces of rock that lead down near to the lower end of the *Garstelet Glacier*. There is here a choice of three ways to the Val de Lys: 1st, turning sharply to the rt., and passing near the Salzia See, the traveller may cross the *Salzia Furke*, a gap in the ridge connecting the Hohes Licht with the Telchenhorn, and descend along the Vordere Salze Bach into the head of the Val de Lys,

close to the extremity of the Lys Glacier; 2nd, by descending due S. from the Garstelet Glacier, he may pass by the Indren to the Gabiet Alp, and thence by the *Lavez Thal* into the Val de Lys; 3rd, and probably a still shorter way, is to pass by the Gabiet See, and descend into the Val de Lys by the *Netsch Thal*, opening near to La Trinité.

Should the traveller follow the first of these routes, he will find near the foot of the Lys Glacier, on its eastern side, a chalet called *Cour de Lys* (6,571'), with better accommodation than usual, and containing one tolerable bed. It may be used by anyone attempting this, or the *Zwillinge Joch*, from the S. side. This is the highest inhabited house in one of the main valleys on the S. side of Monte Rosa, called *Val de Lys*, *Lys Thal*, or *Vallese* in the French, German, or Italian dialects of the neighbourhood. As in the adjoining valleys of Sesia and Anzasca, the population of the upper part is German. The lower part apparently includes a mixture of the Piedmontese element with the Gaulish race of the upper Val d'Aosta. Much speculation has been excited by the presence of a German population, separated from those of the same race on the Swiss side by the range of Monte Rosa, a barrier till lately thought utterly impassable. There is now little doubt that they came originally from the Valais through the Saas Thal, and over the once frequented pass of Monte Moro, crossing in succession the passes leading to the Val Sesia, and thence to the Val de Lys. They may probably have found the upper end of each valley unoccupied, though their activity and industry have created prosperous villages not far from the foot of the glaciers.

A little below the Cour de Lys is a large house belonging to Baron Peccoz, a native of the valley, who, having made a fortune in Germany, was ennobled by the late King of Bavaria, and returned to his birthplace to indulge in chamois-hunting. At St. Jean he has

a collection of stuffed animals and birds, killed by himself, which deserves a visit. The first hamlet is San Pietro, followed by another called San Giacomo, and below these is the village of *Gressonay la Trinité*, about $1\frac{1}{4}$ hr. below the Cour de Lys. [The passes on either side are described in Rte. H.] Farther on is *Noversch*, where live Herr Zumstein (the name is sometimes translated M. de la Pierre), one of the first explorers of the upper region of Monte Rosa. An account of his repeated ascents of the Zumstein Spitze, abridged from Von Welden's work, is contained in King's 'Italian Valleys of the Pennine Alps.' About $2\frac{3}{4}$ hrs. from the châlet is the principal and the lowest of the German villages,

Gressonay St. Jean (Inns: Hôtel Delapierre, very good considering its remote position, landlord very attentive; H. Chianale). By far the most comfortable quarters to be found in the Italian valleys of Monte Rosa are here, but the traveller must not expect as much preparation for his convenience as in the frequented parts of Switzerland. The guides are very inferior to those on the Swiss side of Monte Rosa. The editor has not heard of any in this valley deserving special mention.

'Gressonay is properly the name of the commune which includes all the upper part of the Val de Lys, or Lysthal. There are many hamlets scattered along the course of the stream for a distance of about 8 m. The principal one is that of St. Jean, where alone good accommodation is to be found. The beauty of the scenery, the interesting objects in the neighbourhood, and the comfortable quarters, combine to make this the most desirable stopping-place on the Italian side of Monte Rosa; but for those who desire a close acquaintance with the great mountain, the distance of St. Jean from the head of the valley (fully 3 hrs.' walk to the foot of the glacier) is a serious drawback. St. Jean is 4,659 ft. above the sea.'—[M.]

The situation of Gressonay, amidst

meadows and fruit trees, in a green basin formed by the widening out of the valley, is very beautiful. Several days may be well spent here. Among the more interesting excursions are a visit to the Lys Glacier, the ascent of the Grauhaupt (Rte. H), the Telchenhorn (Rte. G), and that of the Combetta (Rte. I).

From Gressonay to St. Martin in the Val d'Aosta (Rte. B) is considered a walk of 6 hrs., about 16 m. About a mile below the village the valley contracts, and the German inhabitants are left behind. 'The track passes many villages and hamlets, of which the principal are *Gaby*, *Issime*, *Fontaine-moire*, and *Lillianes*, through wild and imposing rock scenery, combined with the richest vegetation, in a manner characteristic of the Val d'Aosta and its lateral valleys. About Trina the valley is strewn with huge rolled blocks or boulders. As you approach the Ponte di Trinità the scene becomes sterner—more shattered precipices and long shoots of débris and detached rocks. Below Issime an unbroken and beautiful wood of sweet chestnut stretches across the valley.'—[M.]

2. *The Zwillinge Joch*. The only account of this pass is that given by Mr. W. Mathews in the second series of 'Peaks, Passes, and Glaciers.' It was traversed for the first time by him and Mr. Jacomb, with Michel and J. B. Croz, of Chamouni, on the 23rd of August, 1861. Two men of the Val de Lys, who were engaged as porters, were sent back from the top of the pass. Following Mr. Mathews, the route is described as taken from the S. side.

'At 2.20 A.M. we left the châlet of Cour de Lys, with a brilliant moon and cloudless sky, crossed the Lys at once, and walked along the moraine on the W. side of the Lys Glacier until we were clear of the Felik Horn, and had reached a ravine coming down from the NW. We turned into this ravine, and after mounting some grassy slopes, climbed up the rocks on our rt., which

led us up' to an immense tract of snow extending from the Felik Horn to the Zwillinge. Here, at 6 A.M., we halted for breakfast, and started again at 7, making straight across the snow-field for the base of a summit which turned out to be an eastern outwork of Castor, the E. summit of the Twins. We were forced to take this course, as the snow plateau is elevated far above the W. arm of the Lys Glacier on very steep precipices of rock, and they are united only by their uppermost portions. Schlagintweit's map of this portion of the range contains many errors. Instead of making for the apparent col, which lies somewhat to the rt., we thought it would be easier to make for another apparently higher and more to the l. This was at the summit of a steep and wide couloir of snow, with a deep crevasse on the rt., and a vertical icicle-fringed wall of snow beyond it. We cut steps up the l. hand lip of the crevasse, and crossing it at the top, gained the ridge at 9.45. Here we found that we had really taken the right course. That which looks from below the true col rises beyond the sky line and joins our col at the same level.—[W. M.]

Finding that they had time to spare, Messrs. Mathews and Jacomb, with Michel Croz, resolved to reach the summit of *Castor*. Having cut steps up the first peak on the W. of the col, and finding this not the true summit, they went on again, and reached the highest point at 10.45. This is 13,879 ft. in height, and therefore overlooks all the summits to the W. between it and the Matterhorn. The view included the whole of the Pennine and Graian Alps, and nearly all the summits of the Bernese chain. To the SW., beyond the Graians it extended to the Cottian and Maritime Alps, with Monte Viso in the midst, and to the range of the Ligurian Apennine.

The summit of the pass had already been reached by Mr. Tuckett in his first attempt to ascend the Lyskamm; and his barometer observation, com-

pared with Geneva, Aosta, and the St. Bernard, gives 13,517 ft. for the height of the col. If the latter comparison ought to be preferred, as is most probable, this measurement should be reduced to about 13,400 ft.

Quitting the col at 12.45, the party ran down the upper slopes of the *Zwillinge Glacier* until they reached the difficult séracs into which it is broken before uniting with the Gorner Glacier. These afford some of the finest snow and ice scenery in the Monte Rosa chain. At 2.30 they had cleared this difficulty, and were upon the ice of the great Gorner Glacier. From that point $\frac{3}{4}$ hr. suffices to reach the path of the Rothe Kumm, and 1 hr. more to arrive at the Riffel Hotel.

It would appear that 10 hrs., exclusive of halts, suffice for the pass from the S. side; 9 hrs., therefore, may be allowed from the Riffel to Cour de Lys, or $11\frac{1}{2}$ hrs. to Gressonay, being a little more than is needed for the Lys Joch. It must be recollected that these estimates refer to the performances of good mountaineers in thorough training. None others should attempt these passes.

ROUTE E.

ZERMATT TO VARALLO, BY THE SESIA JOCH AND THE VAL SESIA.

It is not without hesitation that the pass here described is admitted as such. It is for the present doubtful whether the passage of the ridge between the Signal Kuppe and the Parrot Spitze by Messrs. H. B. George and Moore is to be considered as a *tour de force*, never, or very rarely, to be repeated, or whether when better known the difficulties will be found less formidable. For the present it can with prudence be attempted only from the SE., or Val Sesia side, and in July, when the days are long and the snow has not been melted away from the higher rocks.

A traveller who has reached the Grand Plateau after ascending the

Monte Rosa Glacier has on the E. the summit of the Signal Kuppe (14,964'), and to the SE. that of the Parrot Spitze (14,577'), connected together by a ridge which rises about 300 ft. above the level of the Plateau. On gaining this ridge he looks down upon the Sesia Glacier and the head of the Val Sesia, lying some 8,000 ft. below him, and separated by a series of precipices and ice-slopes that are only less formidable in appearance than those of the E. face of Monte Rosa overhanging the Macugnaga Glacier. The attempt to force a direct passage across this barrier, certainly not less than 14,300 ft. in height, must be counted amongst the most daring of recent exploits in the Alps. The editor has been favoured with the following notes by Mr. H. B. George. The guides were Christian Almer, of Grindelwald, and Matthäus zum Taugwald, of Zermatt.

'We slept at some good châteaux about 23¼ hours from Alagna, reached by the l. bank of the torrent from the Sesia Glacier, and left our quarters at 2.35 A.M. For 3 hrs. we marched over slopes generally knee-deep in rhododendrons, and at last very stony, to a point some way up the left bank of the Sesia Glacier. After a short halt we made our way across the glacier to the right hand corner of the base of the Parrot Spitze, which lay nearly opposite us, and began climbing the rocks of which it is composed. After 2 hrs. of very easy but rapid ascent we had some steep snow-slopes to mount, and then came to the foot of the *arête* that took us almost to the top. The ascent of this is an affair of extreme difficulty, and would scarcely have been possible but for Almer's skill and determination. We tried to get along the ice-slope to the couloir between the Parrot Spitze and Signal Kuppe, with a view to making our way up to the lowest point on the ridge between them, but the couloir itself looked frightfully steep, besides being dangerous from avalanches; so we relinquished it for the *arête*. This consisted of extremely

steep rocks, often affording very slight footing, intermixed with narrow edges of snow, so steep as hardly to admit of steps being cut in the sides of them. After 3½ hrs. of this work we came to a slope of ice, covered a few inches deep with snow varying from 43° to 50°, which in rather more than an hour, or nearly 13 hrs. from our starting-point, brought us to the top; i.e. to a point on the ridge going up from the saddle to the summit of the Parrot Spitze, about 120 ft. below the peak, and perhaps 60 ft. above the true col, which is practically inaccessible. The descent of the Monte Rosa Glacier to Zermatt was straight forward. It would be impossible to take this pass from Zermatt, or either way late in the year when the snow was gone from the gaps in the rock *arête*, and off the steep ice-slope immediately below the top. There are châteaux, not so good, 2 hrs. or more higher up the Val Sesia than where we slept, but we saw no good place for a bivouac. Christian Almer led the way throughout, never being at fault for a moment, although he had only seen the mountain for 10 minutes through a break in the clouds two days before, our whole route remaining hid in cloud until we were fairly on the base of the Parrot Spitze. The view from the summit, including the Italian lakes and Monte Viso, was marvellous.'

—[H. B. G.]

The *Sesia Glacier* is formed in the angle between the eastern ridge of Monte Rosa extending from the Signal Kuppe to the Monte delle Loccie, and the southern ridge connecting the Parrot Spitze and the Vincent Pyramide. Owing to the great steepness of the walls of rock that enclose it, no great accumulation of snow takes place at a high level, and the dimensions of the glacier are small as compared with the height of the surrounding mountains. The N. branch of the glacier, which is not separated by a ridge of rock, as erroneously laid down in Schlagintweit's map, descends from the Col del Pizzo described in Rte. G.

To the S. of the Sesia Glacier on the E. side of the ridge connecting the Vincent Pyramide with the Col delle Piscie (Rte. G), is the *Embours Glacier* which sends down its torrent through the *Embours Thal* to join the Sesia, below the pastures and chalets of the *Pile Alp*. Travellers visiting the Val Sesia should not fail to approach the base of Monte Rosa at least as near as this point, which may be reached in 2 hrs. from Alagna. The view may rank as second only to that from the Macugnaga Glacier. A still nearer view may be gained by ascending the ridge N. of the Embours Thal about $1\frac{1}{2}$ hr. from the Pile Alp. At the head of the latter valley is seen a very fine waterfall, 600 ft. (?) in height, fed by the snows of the Vincent Pyramide.

The first ascent of the *Signal Kuppe* was made in 1842 by M. Gniffetti, the curé of Alagna, who is well acquainted with the mountains, and readily gives advice and assistance to travellers.

After three abortive attempts in 1834, 1836, and 1839, he was finally successful on the 9th of August, 1843. All these expeditions were made by the Lys Joch and the Grand Plateau, occupying two days, and involving a night's encampment on the rocks. As the Plateau is so easily reached by way of the Monte Rosa Glacier, persons desirous of ascending this peak should do so from the Riffel, from which place the whole excursion may readily be effected in a single day. This route to the summit of the Signal Kuppe was first taken in 1861 by Mr. Tuckett, accompanied by Messrs. C. H. and W. F. Fox.

In descending from the Sesia Glacier to Alagna it is best to keep to the l. bank of the torrent until, after joining the track from the Turlo Pass (Rte. H), a bridge with an oratory beside it is crossed. The way then lies chiefly on the rt. bank, again crossing and re-crossing the Sesia. In descending from the Pile Alp the path lies on the rt. bank of the Sesia, descending a steep staircase of rock at the base of the *Staffelberg*, which shuts out the view of

Monte Rosa, until at the oratory above mentioned it joins the main track to

Alagna (Inn : H. Monte Rosa, good, clean, and obliging people). 'Unreasonable demands are made here both for guides and mules, which ought to be resisted.'—[M.]

Though near to some of the finest scenery in the Alps, the position of the village is not very striking, and perhaps on this account the great majority of travellers were, until lately, content to traverse the valley without attempting to become acquainted with its recesses. Increased attention has been given to it of late years, especially since the publication of the Rev. S. W. King's 'Italian Valleys,' and some of the grandest scenes in the Alpine chain have thus been brought within the range of ordinary tourists. The commune of Alagna, including all the upper part of Val Sesia, is German, but frequent intercourse with their Italian neighbours has caused some intermixture of dialects. This is a centre whence diverge many paths leading to passes which are described in Rtes. G, H, and I. The most frequented route is that descending the Val Sesia to Varallo. The distances are as follows :—

	Hrs.' walking	Eng. miles
Riva . . .	$\frac{1}{2}$	$1\frac{1}{2}$
Mollia . . .	2	6
Piode . . .	2	6
Scopello . . .	$\frac{1}{2}$	$1\frac{1}{2}$
Varallo . . .	$3\frac{1}{2}$	$10\frac{1}{2}$
	<hr/> 8 $\frac{1}{2}$	<hr/> 25 $\frac{1}{2}$

Foot-path to Mollia—char-road to Piode—good carriage-road to Varallo.

A rough path leads from Alagna to

Riva, the highest Italian village, with a miserable inn. There is a striking contrast between the apparent poverty of the people and the comparative splendour of the church, covered within and without by fresco paintings of considerable merit, the work of a native artist, one amongst many who have attained celebrity. From the village is a grand view of the peaks and glaciers at the head of the valley.

M. Carestia, the curé of Riva, is an

excellent botanist, but has lately suffered from ill-health. The flora of the southern and eastern valleys of Monte Rosa offers a great general resemblance, but includes several species very rare or unknown elsewhere in the Alps. Of these may be noted *Senecio umiflorus*, *Campánula excisa*, *Potentilla grammopetala*, and *Saxifraga stenopetala*. Still more interesting is the discovery by M. Carestia of *Cherleria imbricata* on the Nase, and near the Vincenthütte above the Lys Glacier.

Close to Riva the metamorphic slates constituting the rocks at the head of the Val Sesia give place to gneiss, which extends from hence to the Val d'Aosta, and farther east passes into syenite.

The descent is easy and agreeable from Riva to *Mollia*, where there is a fair inn. The valley, which is throughout its length very sinuous, here makes a sharp bend nearly due S. to *Piode* (no inn), passing through richly wooded scenery with no distant views. A short way farther the char-road, turning N. of E., reaches *Scopello* (inn poor and dear), where the copper ore raised near Alagna and elsewhere in the valley is smelted. 'Chars may be obtained from Scopello to Varallo for 7½ fr.'—[M.] The next village is *Scopa*, with a clean inn, kept by Giuseppe Topino. The vegetation increases in richness as the track reaches *Balmuccia*, at the junction of the *Val Sermenta*, or *Val Piccola* (Rte. I). Here the stream, which had flowed NE. for some miles, turns due E., and the valley gradually opens out as the traveller approaches.

Varallo (Inns: *Albergo d'Italia*; *La Posta*; both good, the first rather more frequented by strangers, the second has the finer view; *Falcone Nero*, a *trattoria*). The situation of this little town, at the junction of the Val Sesia with the Val Mastalone (Rte. L), and in the immediate neighbourhood of much beautiful scenery, suffices to render it attractive, but the main object of interest to most visitors is the *Sacro Monte*, a famous sanctuary

founded in 1486, and adorned by the labours of many famous artists. It is frequented either from piety or curiosity by very many Italian visitors, but, besides the singularity of much that is here to be seen, the paintings have considerable interest to the lover of art.

The hill, now called *Sacro Monte*, is covered with a series of fifty chapels or oratories containing modelled groups of life size, painted and clothed, representing events nearly all taken from the New Testament. The majority are of no importance as works of art, but some of them, painted by Gaudenzio Ferrari and his pupils, are extremely interesting. The chapels are numbered, and those best worth examination are: 5. The appearance of the Star in the East. 17. Transfiguration. 38. The Crucifixion. The paintings on the walls and ceiling of the latter chapel are considered the best works of Gaudenzio Ferrari.

Other works of importance by the same master are the frescoes which cover the screen between the choir and the nave in the church of St. Francesco at the foot of the *Sacro Monte*, and an altarpiece in the Church of St. Gaudenzio.

Varallo stands upon true granite, which forms a band extending N. to the head of the *Val Bagnola*, and SSW. to Biella (Rte. K). Out-lying masses of the same rock are seen in the well-known sites of Mont Orfano and the Motterone near the Lago Maggiore.

The most frequented way, and deservedly so, for those travelling E. or S. from Varallo is by the lake of Orta (Rte. L). A more direct and easy, and, for the first part of the way, a very beautiful route, is to follow the carriage-road along the Sesia due S. to *Borgo Sesia*, about 7 m., then amidst richly wooded slopes, picturesque with churches and ruined castles, 8 m. farther to *Romagnano*. Here the river Sesia enters the plain of Piedmont and flows to Vercelli. The high-road goes direct to *Novara*, at the junction of the railways to Turin, Milan, Genoa (by

Alessandria), and Arona on the Lago Maggiore. An omnibus runs twice daily from Varallo to Novara. Those who travel by it see little or nothing of the country.

Between Borgo Sesia and Romagna the road lies between porphyritic rocks, in which masses of jurassic limestone, and marine tertiary molasse are strangely intermixed.

ROUTE F.

ZERMATT TO VOGOGNA, BY THE WEISS THOR, AND THE VAL ANZASCA.

It is certain that a passage across the head of the Gorner Glacier, and down the face of the rocks which form the W. enclosure of the Macugnaga Glacier, was long ago known to some of the people of Zermatt. Damatter, an old chamois-hunter, remembered by the early visitors to Zermatt, had frequently crossed it, but he assured the writer in 1845 that the pass had become impracticable owing to the accumulation of ice overhanging the rocks whereby the descent was formerly made. It is certain that the old pass lay somewhere between the Cima de Jazi and the base of the Nord End, and equally certain that notwithstanding the above statement of Damatter the pass from the Gorner Glacier to the head of the Filar Glacier was effected at or about the same point as the old passage by Adolph Schlagintweit in 1851. From that time the old route seems to have been abandoned until 1861, when Mr. F. F. Tuckett made the ascent from the E. side, by the Jazi Glacier and the rocks above it, and some weeks later Professor Tyndall achieved another passage from the Macugnaga Glacier. They selected different routes, Mr. Tyndall having mounted by a couloir above the Filar Glacier, and there is reason to think that neither followed the exact line of the old pass, while both of them encountered such serious

difficulties as to make their example unfit for general imitation. Except as a matter of curiosity to an adventurous mountaineer, the old Weiss Thor may now be considered as closed to travellers. The height of the ridge where passed by Schlagintweit is about 11,800 ft., while Mr. Tuckett's pass is 11,976 ft. in height.

As early as 1845 there was a report that another pass by the N. side of the Cima de Jazi had been found by some chamois-hunter, and the pass now known as the New Weiss Thor was certainly effected in 1850 by two English travellers, the Rev. Edmund Docker and Mr. J. Eardley Blackwell, although its discovery has been generally attributed to Professor Ulrich in 1852. It lies but a short way N. of the Cima de Jazi, so that by starting early from the Riffel, there is ample time to enjoy the view from that summit before making the descent to Macugnaga. See Rte. A, Excursion 2.

The following description of the pass, from the pen of the present writer, is for the most part extracted from 'Murray's Handbook.'

After skirting the NW. base of the Cima de Jazi, or on descending from it, if the traveller should be tempted by clear weather to make the ascent, he will reach a slight depression in the ridge connecting it with the Strahlhorn. After ascending for a short distance on the N. side of this depression — 11,851 ft. above the sea — a point is reached where in two or three steps the scene is changed as if by enchantment. Instead of toiling over a snowfield, with no object visible save boundless fields of *névé* and occasional black rocks, the traveller on gaining the E. edge of the ridge finds himself on a narrow ledge of rock apparently overhanging a precipice. On the N. or left-hand side this terminates in a projecting buttress only a few yards distant; in the opposite direction the precipitous wall on whose summit he is standing is seen to extend far to the southward, until it is united to the

tremendous eastern face of Monte Rosa. The highest intervening summit is that of the Cima de Jazi, not more than 700 ft. higher than where he stands. The precipice terminates only a few feet from the summit of the Cima; and there, and in many other places, the thick layer of snow which coats the top of the ridge is seen to form an overhanging cornice that might be easily broken away by the weight of an unwary traveller. Looking downward, if the valley below be clear, the traveller sees the lower end of the Macugnaga Glacier, about 6,000 ft. below him, appearing so near that a stone flung from the hand might reach it. It far more commonly happens, even in fine weather, that a sea of cloud hangs like a pall between the valley below and the spectator. Lying, as they do, some thousands of feet below him, he supposes the clouds to fill the valley, while the people of Macugnaga, seeing clouds three or four thousand feet above their heads, imagine that they cover the mountain tops. The single point at which the edge of the precipice is conveniently reached is often selected by the guides as a halting-place for luncheon. The adjoining rocks afford a home to a few flowering plants: e. g., *Androsace glacialis*, *Eritrichium nanum*, *Gentiana brachyphylla*, and *Saxifraga planifolia*. This is one of the highest stations at which flowering plants have been found in the Alps. However uninviting the appearance of the precipice may be, even to mountaineers, it is quite possible to descend directly from this point, but the guides seldom choose that course. The rocks are excessively steep, and there are one or two points that are scarcely safe, except to practised cragsmen. The usual course is to ascend along the ridge for a few yards farther to the N., until a few projecting rocks are reached. At this point the great wall connecting Monte Rosa and the Strahlhorn, along the top of which the track has hitherto lain, is joined by a transverse ridge running in an easterly

direction, and forming in this place the boundary between Switzerland and Italy. This transverse ridge is much lower than the wall against which it abuts, and at the point of junction it is united by a steep buttress of rock partly coated with snow and ice. It is by this buttress that the pass of the *New Weiss Thor* is usually effected. The N. side looks towards Saas, and overhangs the *Schwarzberg Glacier*, which descends near to the Distel Alp. The S. side of the buttress faces the Macugnaga Glacier. It is by the N. side that the first part of the descent is made, along some very steep but not dangerous faces of rock. There is good holding-ground for hands and feet. After about a quarter of an hour the chief apparent difficulty of the pass is encountered. This is an extremely steep ridge of snow, sometimes frozen hard, along the edge of which the descent lies. With good guides, and proper use of the rope, there is no danger.

At the foot of this are some steep rocks with snow between them. The track now takes to the Macugnaga side of the ridge, and the remainder of the descent is alternately over rocks, piles of débris, and snow-slopes which are sometimes favourable for a *glissade*. Here the rope, which ought to have been in use since reaching the *névé* of the upper part of the Gorner Glacier, may be laid aside, and the remainder of the descent presents no difficulties. From 9 to 10 hrs. (according to the state of the snow) should be allowed for reaching Macugnaga from the Riffel Hotel, exclusive of halts. At least an hour more should be allowed in taking the pass from Macugnaga to the Riffel, which involves a much longer and steeper ascent. Clouds often gather round the summit, and the services of a thoroughly experienced guide are essential. [From the foot of the *arête* it is easy to reach the Schwarzberg Glacier, and so descend into the valley of Saas, a little above the inn at the Mattmark See. (See Rte. N.)]

On reaching the level of the valley

just below the end of the Macugnaga Glacier, the torrent of the *Anza* which issues from it at several places is crossed to the l. bank, and in less than an hour the traveller reaches

Macugnaga, the highest village in the Val Anzasca, 4,369 ft. above the sea. There is a very fair little inn, *Hôtel du Mont Moro*, chez Gaspard, near the bridge, and another very rough and primitive, *Zum Monte Rosa*, kept by Franz Lochmatter, the best guide of the valley. Many mountaineers have patronised the latter out of regard to the owner, who is much liked by his employers, but his attentions and those of his wife scarcely make up for the numerous deficiencies of his house to those who remain for more than one night. There is as yet no accommodation worthy of the position of the village at the head of the most beautiful valley in the Alps. Mules are kept here, but not always in numbers equal to the demand. Ladies crossing the *Monte Moro* from Saas on foot, and intending to continue their journey on mule-back, should, if possible, order mules in advance. By whatever route a traveller may reach *Macugnaga* he should not fail to visit the *Macugnaga Glacier*, and he will not do wisely if he does not devote a whole day to the enjoyment of a scene which is probably unequalled in the world.

The best plan is to make a circuit, so as to vary the point from which the glacier and the great ranges that enclose it are beheld. In approaching the glacier from *Macugnaga* the traveller has before him the precipices on either side of the *Cima de Jazi*, and, seen from here, the various points at which the passage to *Zermatt* has been effected will all appear nearly equally inaccessible. Mounting along the rt. bank of the *Anza*, and crossing the stream near the foot of the glacier, he will first ascend a steep rocky eminence, called the *Belvedere*, which breaks the descending ice-stream, and divides its lower end into two branches. This grand point of view is

accessible by mules in 2 hrs. from the village, and ladies usually content themselves with this portion of the excursion. The traveller should now cross the W. arm of the glacier, and ascend from its l. bank to the *Châlets of Jazi*, at the base of the *Cima*. He should then continue along the slope to the *Châlets of Filar*, the highest on this side, at the foot of the *Filar Glacier*, which descends from the ridge between the *Nord End* and the *Old Weiss Thor*. Crossing a steep moraine, he should now return to the glacier, here much crevassed, and make his way towards its head, immediately under the vast wall, rising almost vertically for 8,000 ft., which is surmounted by the *Höchste Spitze* and the *Nord End*. The usual limit of the excursion is near to a waterfall—fed by the snow-slopes that cling here and there to the face of the precipice—which disappears in a chasm in the ice. The monotonous roar of the cataract is broken from time to time by the thunder of avalanches. Language is incompetent to give any idea of the grandeur of the scene.

Returning, and bearing towards the E. moraine, the glacier is left near the *Châlets of Pedriolo*, at the base of the *Pizzo Bianco*, the beautiful peak, connected by a high ridge with the *Monte delle Loccie*, which forms the E. side of the great amphitheatre. The enormous size of the blocks that cover the lower slopes near the *châlets* excite wonder. It has not been shown whether they have fallen from the *Pizzo Bianco*, or been transported by ice from the ridges enclosing the head of the glacier. A very rough and steep path leads along the mountain side, for the most part high above the glacier, and finally descends to *Macugnaga*. The whole excursion need not occupy more than 8 or 9 hrs., but it is a better plan to take provisions, and give a long day to scenes that, when viewed under favourable circumstances, can never be forgotten.

The ascent of the *Pizzo Bianco*, long ago made by *Saussure*, must be one of the most interesting in the Alps, and

should be oftener repeated by mountaineers who are fortunate enough to enjoy clear weather.

Moderate walkers, who object to risk and fatigue, should not fail to ascend the *Monte Moro* (Rte. N), even though they do not intend to cross the chain into Switzerland. The view is scarcely surpassed even in this neighbourhood, and in returning to Macugnaga it remains constantly before the traveller's eyes.

In descending the Val Anzasca from Macugnaga the traveller has the disadvantage of turning his back upon Monte Rosa, which at intervals comes into view; but the near scenery is throughout so beautiful that it fully engages his attention; and, if he be wise enough not to hurry, he may halt at intervals to enjoy the wonderful views of the great mountain. The first of these is found at *Borca*, about $1\frac{1}{2}$ hr. below Macugnaga. The comfortable little inn formerly open here has been closed since the owners moved down the valley to Vanzone. So far the population is German. For a few miles farther it appears to be mixed, and lower down it is exclusively Italian.

Pestarena (Inn: Albergo delle Miniere, fair and reasonable), about $\frac{1}{2}$ hr. below Borca, is a poor-looking village with a mining population. Gold, associated with iron pyrites, is found here in quantities which repay the working, and this is one of the few spots in Europe where it has been continuously extracted for centuries, apparently since the time of the Romans. After descending along the l. bank the path crosses the Anza, and soon begins to ascend a rocky hill which appears to bar the valley. This is called the *Morgen*, and has proved a serious obstacle to the construction of a char-road up to the mines. The Anza forces its way through an impracticable ravine, while the mule-path, after mounting some way, descends more steeply on the E. side of the barrier, and at its base returns to the rt. bank of the stream, near the hamlet of Campiolo. In the early summer the beautiful *Saxifraga corymbosa* is plentiful on the rocks

hereabouts. A short distance farther is *Prequarero*. A path descends here from a lateral valley to the l., which leads from the valley of Saas (Rte. N) by a pass said to be rather shorter and easier than that of Monte Moro. As it misses the grand scenery of that rte. it is never taken by tourists. From hence a char-road is open to Ponte Grande. A view of the E. face of Monte Rosa combined with a new foreground, but always surpassingly grand, opens out before reaching *Ceppo Morelli* a small hamlet with a poor inn. The near scenery increases in richness, and the view of Monte Rosa in grandeur, as the traveller, in about $3\frac{1}{2}$ hrs. from Macugnaga, finds, at 2,284 ft. above the sea, the principal village of the valley,

Vanzone (Inns: H. des Chasseurs, pretty well kept by Albasini, formerly of Borca; Sole; Moro). Two churches connected together are well worth a visit. It is hard to say that anything is wanting to complete the beauty of the Val Anzasca. Monte Rosa remains constantly in the background, unsurpassed in the boldness of its form and the vastness of its proportions. The middle distance presents mountain ridges of varied form, clothed with pine forest, or broken into rocky masses. The vegetation of northern Italy is in the foreground, rich with chestnuts, and vines, and fig-trees, and all the accessories are characteristically Italian. Instead of small, dark, wooden houses, grouped round the pointed spire of a village church, we have here massive buildings in solid masonry, brilliantly white, and nearly all covered, within and without, with rude frescoes; and the square *campanile* marks from a distance the village place of worship. Two m. from Vanzone is

Ponte Grande (Inn: Albergo al Ponte Grande, a large house with some good rooms, improved of late years, but often noisy; 'good, but people very tricky.'—F. J. H., 1860.) The village took its name from a high arch that spanned the Anza, which was carried away some years ago; it has been replaced

by a wooden bridge. The Val Olloccia (Rte. I) from the S. here joins the main valley, and the village of *Banio*, on the S. side of the Anza, stands on rising grounds, amidst fine chestnut trees, close to the junction.

A day or more may well be given to a halt here, or at Vanzone.

The road to Vogogna, which is about 9 m. distant, and may be reached in $1\frac{1}{2}$ hr. in a carriage, is carried along the N. side of the valley, at first near the bank of the Anza, and gradually rising to a great height above the stream. A short way below Ponte Grande the torrent issuing from Val Bianca forms a pretty waterfall, and some way farther the road passes *Calasca*, said to have a tolerable inn. On the S. side of the valley is seen the opening of Val Serpiano, leading to the Val Strona (Rte. M). About 5 m. from Ponte Grande is *Castiglione* (1,720'), with a country inn. Beyond the village the traveller, once again looking back, may see the view of Monte Rosa in great perfection, and soon begins to descend rapidly, passing through two short tunnels. The hamlet of *Cima di Mulera* is left on the way, and the road issues into the Val d'Ossola at *Piè di Mulera*. This village is little more than 1 m. from *Vogogna*, on the high-road of the Simplon, which is reached by crossing the ferry over the Toccia (§ 21, Rte. A). A road turning to the l. at *Piè di Mulera* soon joins the great road, and leads in about 7 m.—rather less than 15 m. from Ponte Grande—to Domo d'Ossola.

The passes from Ponte Grande to the Val Sesia and to Orta are described in Rtes. I, L, and M.

ROUTE G.

TOUR OF MONTE ROSA, BY THE HIGH GLACIER PASSES.

By choosing a wider or a narrower circle round Monte Rosa, a traveller may completely change the character

of the scenery through which he will pass in making the tour of the mountain, and in the same degree vary the difficulty of the undertaking. Supposing the Col delle Loccie to be constantly passable, the circuit from Zermatt may be made by the series of passes included in the present rte. in 5 days, and can scarcely be equalled by any other continuous rte. in the Alps, not excepting the 'High Level Rte.' from Zermatt to Chamouni.

On the first day Macugnaga would be reached by the Weiss Thor, described in the last Rte.; the second day leads to Alagna, or the Pile Alp, by the Col delle Loccie; the third, by the Col delle Piscie to the head of the Val de Lys; the fourth, by the Betliner Pass, or the Betta Furke, to San Giacomo in the Val d'Ayas; and the fifth, back to Zermatt by the Cimes Blanches and the Col de St. Théodule. Fine weather is indispensable for the first two and the last days' walk. The second and third days' journey may be much reduced by sleeping at the Pile Alp, nearly 2 hrs.' walk above Alagna, but some travellers will think the saving dearly purchased at the price of enduring chalet fare and sleeping quarters. A very active walker might doubtless combine the Col delle Piscie and the Betliner Pass in one day from the Pile Alp to San Giacomo, but accurate information is wanting as to both passes.

The *Col delle Loccie*, leading from Macugnaga to the head of the Val Sesia, was crossed for the first time in 1862 by Messrs. W. E. Hall and J. A. Hudson, with Franz Lochmatter and his brother Alexander. Both are good guides, but disposed to set a high value on their services. The pass must be reckoned as first-rate, both for the grandeur of the scenery, and for difficulty. A short but very steep ice-slope close to the top, on the Macugnaga side, would be a serious obstacle to any one attempting the pass from Alagna, but with practised ice-men, and an ample supply of stout rope, it should not be insurmountable.

Having reached the Châlet of Pedriolo (Rte. F) in rather more than 2 hrs., Messrs. Hall and Hudson commenced the ascent over the upper and gently-sloping portion of the Macugnaga Glacier.

Looking about due S., an arm of the glacier, cut up by numerous wide crevasses, leads to the ice-slope below the col. To the rt. are massive precipices of dark rock, seamed by couloirs in great part clear of snow. After ascending as far as possible by the glacier, in $4\frac{1}{2}$ hrs. from Macugnaga, the party commenced the ascent of these rocks, having first traversed a rather difficult bergschrund. Irrespective of two short halts, $2\frac{1}{2}$ hrs. were consumed in climbing up this steep and difficult barrier. Above is a region of séracs, which was traversed in $1\frac{1}{2}$ hr. more, and then another bergschrund defends the base of the final ice-slope. This is very steep, the inclination being estimated at 50° ; but 74 steps sufficed to reach some projecting rocks, separated by a few yards only from the summit of the pass.

Some slight doubt remains whether the peak immediately to the E., and seemingly easy of access from the col, is the same with the *Monte delle Loccie* laid down on most maps, and conspicuous from many points in the neighbouring ranges. It seems certainly to be the same with the *Cima del Pisse* of Studer's map, also called *Cima del Pizzo*, and it is generally believed that the three names are synonyms for one and the same summit. As the pass undoubtedly traverses the lowest point in the ridge connecting the Signal Kuppe with the *Monte delle Loccie*, the name *Col delle Loccie*, proposed by Mr. Hudson, seems unobjectionable. It was estimated, by comparison with the Weiss Thor, to be about 12,000 ft. in height.

Notwithstanding a few troublesome crevasses, the descent of the branch of the Sesia Glacier, lying on the S. side of the col, was rapidly effected, and in little more than $1\frac{1}{2}$ hr. of rapid progress the travellers reached the highest

pastures. A little lower down they found a châlet, which might be turned to account by anyone attempting the pass from this side. Rather more than $2\frac{1}{2}$ hrs. were employed in descending thence to *Alagna*. The châlets of the *Pile Alp*, at the junction of the stream from the Val d'Embours with that from the Sesia Glacier, might be reached in $1\frac{1}{2}$ hr. less time, and nearly 2 hrs. would thus be saved in the next day's journey.

The *Col delle Piscie* is the passage over the ridge extending S. from the Vincent Pyramide, which separates the Val d'Embours from the Indren and Garstelet Glaciers. At the top of the pass, which is 10,374 ft. in height, is a stone hut known as *Vincenthütte*, originally built for the men engaged in working a supposed gold mine long since abandoned. It was occupied for fourteen days, in 1851, by the brothers Schlagintweit, while engaged in scientific observations, and is admirably situated for an Alpine observatory. On the Embours side the ascent is said to be steep and rather difficult; but on the W. side the *Col delle Piscie* is unusually easy of access, a mule-path, intended for the use of the miners, having been carried up to a large shed, 9,672 ft. in height, $\frac{1}{2}$ hr. below the col. Two small glaciers—*Indren Glacier* and *Garstelet Glacier*—lie on the S. side of the Vincent Pyramide, and send down their streams to join the Lys about a mile below the châlet of Cour de Lys, already noticed in Rte. D, where a mountaineer may find tolerable quarters. A traveller bound from the *Col delle Piscie* to Gressonay, or to the Betta Furke, should follow the Lavez Bach, which unites the streams from both glaciers, but to reach Cour de Lys or the Betliner Pass it is better to cross the Salzia Furke direct to the foot of the Lys Glacier. A mountaineer, having a few hours to spare at the head of the Val de Lys, may well occupy the time in making the ascent of the *Telchenhorn*, lying immediately E. of

the châlet, and commanding a very fine view of the neighbouring glaciers. The summit may be reached in 2 hrs. It is sometimes visited from Gressonay, but is not so interesting as the Grauhaupt (Rte. H).

It is probable that the shortest way in time from the Cour de Lys to San Giacomo d'Ayas is by the *Betta Furke*. This is reached by a glen opening to the W. from the Val de Lys, about $\frac{1}{2}$ hr. below the châlet. An ascent of about $1\frac{1}{4}$ hr. suffices to reach a small oratory, with a fine view of the snowy chain to the N., and about as much more to gain the summit of the pass, said to be 8,862 ft. in height; but, as the writer believes, this is an over-estimate. Several clusters of châteaux are passed in descending to San Giacomo (Rte. C), where tolerably good quarters are now found. The village may, by this route, be reached in 5 hrs. from Cour de Lys, or in 7 hrs. from Gressonay.

The *Betliner Pass* lies farther N. than the *Betta Furke*, and apparently offers a more direct communication between the head of the Val de Lys and that of the Val d'Ayas, but no information respecting it has reached the editor.

San Giacomo stands near the junction of the torrent from the Ayas Glacier (Rte. C), with that from the *Aventina Glacier*, lying farther W., on the S. slope of the Breithorn. The snowy range extending SSW. from the Petit Mont Cervin, and known by the general name *Cimes Blanches*, must be crossed in order to reach Zermatt by the glacier and col of St. Théodule. It would appear that the same course is not always taken by the guides, and the pass is so ill defined that it would be very imprudent for a stranger to cross it without one. A traveller must not, however, count on finding competent guides at San Giacomo; and in making the tour sketched out in the present route, it is assumed that he is accompanied by, at least, one first-rate guide who has had previous experience in the district.

A very active walker gives the fol-

lowing distances from San Giacomo to Zermatt:—‘San Giacomo to Cimes Blanches, $3\frac{1}{2}$ hrs., the first half-hour being the steepest and hardest: Cimes Blanches to St. Théodule Pass, $1\frac{1}{2}$ hr.: St. Théodule to Zermatt, $2\frac{1}{4}$ hrs.’ The time required varies, of course, with the state of the snow; but an ordinary walker, under ordinary circumstances, may safely add one-fourth to the above reckoning. Rather more than half-way to the summit the traveller passes the châteaux of *Aventina*, and in about $\frac{1}{2}$ hr. more reaches the névé. In crossing here without a rope, the Syndic of Gressonay was lost in a concealed crevasse in 1852. Having managed to scramble up close to the edge of the crevasse, the ice gave way a second time, and the unfortunate man fell so deep that, though men were let down with long ropes, his body was never seen again.

‘The approach to the Col de St. Théodule from the Cimes Blanches is much harder than from Breuil, or from the Zermatt side; the last pull being up a very steep snow-slope for 25 min. At the same time, the views are incomparably grander, and to anyone coming from the SE. to Zermatt this combination of the two passes saves a day without involving a very hard day’s work.’ —[J. R. K.]

ROUTE H.

VALTOURNANCHE TO MACUGNAGA, BY THE MIDDLE PASSES.

A traveller wishing to make the tour of the Italian valleys of Monte Rosa may choose an intermediate course between the somewhat arduous passes mentioned in the last Rte., and the easier and more frequented paths described in Rte. I, and in four days of very moderate walking may include much of the most beautiful scenery of this district. Starting from the W. end of the circuit, the first pass may be taken either from Châtillon or Breuil,

according as the traveller may happen to approach from Aosta or Zermatt; but it is most easily made from the village of Valtournanche (Rte. B), and it would be possible, though not advisable, for an active walker to cross the Col de Portola and the Col de Pinta in a single day, so as to reach Gressonay at night.

To reach the *Col de Portola* from Valtournanche the traveller descends the valley for a short distance along the l. bank of the stream, and soon takes a path to the l., which before long begins to ascend through a wood. This splits up into numerous tracks, and a guide here is almost indispensable. The true path keeps a general direction nearly parallel to the main valley, mounting a little E. of S., along steep ledges of rock, until it gains a point about 2,000 ft. above the stream, whence the greater part of the beautiful Val Tournanche is seen backed by the peak of the Matterhorn, and the range extending S. from the Château des Dames. Quitting the verge of the mountain side, the path now bears SE., across Alpine pastures, and before long reaches the village of *Chamois* (6,004'). A rather long but gentle ascent leads thence to the summit of the pass, 7,995 ft. in height, lying across a ridge of limestone rock that steeply overhangs the valley and village of *Ayas*. Though rapid, the descent is quite free from difficulty. If solicitous for comfort, the traveller will descend the valley for $1\frac{1}{2}$ hr. to Brusson (Rte. C), but it is said that tolerable accommodation for the night may now be had at *Ayas*, or a little higher up the valley, at *Champolien*.

At the last-named hamlet commences the ascent to the *Col de Pinta*. This leads across the range separating the valleys of *Ayas* and *Lys*, immediately to the S. of the *Grauhaupt*. The pass may be effected in 6 hrs., or even less; but a traveller, favoured by tolerable weather, should not omit the ascent of the adjoining peak which commands the finest view of the S. side of Monte Rosa. The greater part of the ascent from

Champolien to the Col is easy enough, commanding at intervals fine views of the Matterhorn, but after about 3 hrs. the way becomes steep, and difficult to find. It lies along the l. bank of a waterfall, and in $\frac{3}{4}$ hr. farther leads to the crest of the Col. The summit is probably about 8,200 ft. in height. It has a wide view to the W. which includes Mont Blanc and the higher peaks of the Cottian Alps, but is shut out from Monte Rosa by the adjoining peak of the *Grauhaupt*, or *Graues Haupt*, which may be attained in 2 hrs. The ascent is rough, lying in great part over and amidst large loose blocks; but except close to the top, where the rocks become very steep, it presents no difficulty. The height is 11,031 ft., overtopping all the nearer summits, and the panorama is one of the finest on the S. side of the Alps. *Campanula cenisia*, *Eritrichium nanum*, *Linaria Alpina*, *Carex curvula*, and a few other flowering plants, have been found close to the summit.

The descent from the Col de Pinta towards the Val de Lys is easy and practicable for mules. In less than an hour, following at first the bank of an Alpine rivulet, the track reaches the highest chalet, and in $\frac{1}{2}$ hr. more arrives at a larger establishment in the midst of fine pastures. The last part of the descent is steeper; the path is carried down the l. side of a waterfall, joining, in about 2 hrs. from the col, the main path from Noversch to Gressonay St. Jean, about $\frac{1}{2}$ hr. above the latter village. In taking the path from Gressonay, at least 3 hrs. should be allowed for the ascent to the Col, and about $2\frac{3}{4}$ hrs. for the descent to the Val d'*Ayas*.

Visitors to Gressonay should on no account omit the ascent of the *Grauhaupt* if favoured by moderately favourable weather. Mountaineers who do not fear a stiff scramble will find it more interesting to make the ascent by the E. end of the mountain overhanging the Val de Lys, and to reach the summit partly along the shattered

ridge, partly along the ledges of its S. face: they can return by the Col de Pinta. The bouquetin still haunted this range in 1840. The range separating the valleys of Ayas and Lys is passable at many points, but the path of the Col de Pinta is the most interesting, while the Col de Ranzola (Rte. I) is the easiest pass.

The traveller, following the line of the so-called Middle Passes, will do best to select the Col d'Ollen for his route from Gressonay to Alagna.

This very beautiful pass is practicable for mules, though it is expedient to dismount for part of the descent on the E. side. Mules take 8 hrs. exclusive of halts, but an active walker may gain an hour on four-footed beasts over such rough ground.

On leaving Gressonay the way lies up the valley for $1\frac{1}{2}$ hr. to San Giacomo. Here a track bears to the rt., and mounts in $1\frac{1}{2}$ hr. more through very beautiful scenery to a small tarn called the Gabiet See, near to which are several châteaux where milk may be obtained, and then a steeper ascent leads in less than 2 hrs. more to the crest of the pass, 9,544 ft. in height. The view here is already very fine, but in clear weather the traveller should not fail to reach the summit of the *Gemstein*, but half an hour's climb from the pass, and commanding a view of the nearer peaks of the great range, preferable even to that from the Grauhaupt. The range separating the head of the Val de Lys from that of the Val Sesia, though lofty, is easily traversed in various directions, and it is said that from the Col d'Ollen it is not difficult to reach the Val d'Embour and the Pile Alp on one side, or the track descending to the Cour de Lys on the W. side of the Col delle Piscie (Rte. G). It is in the same degree easy to lose the way in case of clouds coming on, and except in the finest weather the mountaineer should not attempt this pass without a guide.

The descent from the Col d'Ollen to Alagna is for some time very steep.

About $1\frac{3}{4}$ hr. from the top is the châlet of Laglietto, and the way continues down the mountain direct to the village of Alagna, reached in 3 hrs. from the summit. In the opposite direction 4 hrs. are allowed to attain the pass, $2\frac{1}{2}$ hrs. for the descent to the Val de Lys, and $1\frac{1}{2}$ hr. more to reach Gressonay.

There is a more direct way from Gressonay to Alagna by the *Col d'Oltro*: information respecting it is desired. It is not likely that it can rival in point of scenery the Col d'Ollen.

The traveller wishing to go in one day from Alagna to Macugnaga, and not prepared to attempt the Col delle Loccie (Rte. G) from this side, which must at the best be a very difficult undertaking, has no choice but to proceed by the Turlo Pass. This is a somewhat tedious, and, by comparison with the grand scenery of this district, an uninteresting pass. In the writer's opinion, its defects are comparative rather than positive, and there is quite enough to engage the attention by the way, and to satisfy a contented spirit. Those travellers, however, who are not much pressed for time, will do well to turn aside at Alagna from the line of the Middle Passes and reach the lower part of the Val Anzasca at Ponte Grande by one or other of the beautiful lateral valleys described in Rte. I, or else to follow either of the tracks there mentioned leading from Rima or Carcoforo to Macugnaga.

The *Turlo Pass* is longer but not quite so high as the Col d'Ollen, and the same time may be allowed for each: this is, however, impassable for mules. The path ascending the valley along the stream is followed from Alagna, till in nearly one hr. it crosses to the l. bank, leaving on the opposite side the track along the base of the Staffenberg leading to the Pile Alp, and soon begins to mount the slope to the rt. with grand views of the Signal Kuppe and the Parrot Spitze, rising above the Sesia Glacier. The ascent is rough and stony, especially when, after pass-

ing some very miserable huts, the track winds round a dreary hollow in the mountains, and in about 4 hrs. from Alagna gains the Col, marked by a cross. The top 9,088 ft. in height, is a very sharp ridge of crystalline slate, shut out from the view of Monte Rosa by the Monte delle Loccie, which is itself a fine object. From a rocky point in the ridge to the rt., the Lago Maggiore and the Tessin Alps are visible. The descent on the NE. side is for some distance rather steep. After crossing some snow-slopes the faintly marked track winds to the l., but the mountaineer may shorten the way, taking some care of the slippery grass and rhododendron bushes that clothe the declivity of the mountain. A long descent finally lands the traveller at the head of the *Val Quarazza*, and looking back he finds himself surrounded by a semicircular range in which tiers of rock alternate with green slopes. The track descends gently through the lower part of the glen, amid pleasing scenery, to *Borca* (Rte. F), reached in $2\frac{1}{2}$ hrs. from the pass, and about $\frac{1}{2}$ hr. higher up the main valley is *Macugnaga*. There is a track turning to the l. above the junction of the *Val Quarazza* with the *Anza*, and avoiding *Borca*, which shortens the way to *Macugnaga*.

ROUTE I.

AOSTA TO PONTE GRANDE, BY THE LOWER PASSES.

The tour described in this Rte. is in great part a frequented line, now traversed every year by numerous tourists. As it is that most generally followed by unambitious travellers who wish to connect a visit to Courmayeur with the easily accessible parts of the Monte Rosa district, it has been thought convenient to include in this Rte. the entire line from Aosta to Ponte Grande. Assuming that the traveller adheres to the easier mule-track first described,

not less than four days must be allowed between those places; but by using one or other of the passes connecting the upper Val Sesia with the Val Sermenta, the distance might be brought within the compass of three days' journey. It is scarcely necessary to say that a judicious traveller will, when possible, give at least double that time to a route which traverses some of the most beautiful scenery of our continent. Tolerable accommodation is now found at many places on the way. The following distances are approximately correct:—

	Hrs.' walking	Eng. miles
Châtillon . .	$4\frac{1}{2}$	15
Brussone . .	3	9
Gressonay . .	4	11
Riva . .	6	15
Mollia . .	2	6
Scopa . .	3	9
Rimasco . .	3	9
Carcoforo . .	$1\frac{3}{4}$	5
Cold'Egua . .	2	5
Ponte Grande .	4	10
	<hr/> 33 $\frac{1}{2}$	<hr/> 94

The high-road from Aosta to Châtillon is hot and dusty, and few travellers pass it on foot. Those who hire a vehicle may best arrange to take it to St. Vincent, 2 m. beyond Châtillon, where the path to Brussone turns off from the high-road; and by starting in good time they may easily reach Gressonay before sunset. About 2 m. from Aosta the Château de Quart stands in a commanding position on the N. side of the valley, and the pedestrian may turn aside to enjoy the fine view, and return to the high-road near to Villefranche, without much loss of time. About 7 m. from Aosta is the opening of the Val de St. Barthelemi (§ 18, Rte. H), and a little beyond is the village of *Nus*. Nearly opposite is St. Marcel, at the opening of the *Val de St. Marcel*, a glen leading up to the *Punta di Tersiva*, one of the principal peaks of the Cogne Alps. A little farther E. is the castle of *Fenis*, and beyond it to the S. opens another valley bearing the same name. The next village on the high-road is *Chambave*, which gives its name to a wine of

some repute in Piedmont, and 3 m. farther is Châtillon (Rte. B). At the baths of *St. Vincent*, 2 m. farther on, the mule-path to Brussonne turns off to the l. from the high-road, which here bends to SSE. For a while the magnificent chestnut-trees screen the traveller from the hot sun, which beats upon him with full force as he emerges on the slope of the mountain. As he winds upwards the view along the Val d'Aosta becomes continually more commanding, and at the little chapel of *St. Grato* he may well halt to enjoy the prospect, which lays before him the finest part of that beautiful valley for a length of more than 25 m., backed by the mass of *Mont Blanc*. Towards the summit of the *Col de Jou* the way lies over broad sweeps of rich pasture on the S. slope of the *Mont Zerbion*. The summit of this mountain, 9,003 ft. in height, is said to command a noble view. It may be reached in 5 hrs. from Châtillon, or in rather less time from *St. Vincent*, or from Brussonne.

A very gentle descent leads from the *Col de Jou* to *Brussonne* (Rte. C), reached in $2\frac{1}{2}$ hrs. from *St. Vincent*, where there is now a good mountain inn, and where a day or two may well be spent in exploring the Val d'Ayas and the ranges that enclose it. In ascending by the mule-track to the *Col de Ranzola*, leading to Gressonay, the traveller looks due S. over the lower part of the valley of the *Evanson*, called *Val Challant*, terminating at *Verrex*, in the Val d'Aosta (Rte. B). Approaching the summit (7,136') an unexpected view of *Mont Blanc* is gained by looking back towards the W., but *Monte Rosa*, much closer at hand, is shut out by nearer masses. After descending some way on the E. side, a portion of that great mountain comes into view, and in the middle distance the village of Gressonay, set in a framework of green meadows, and pine forest, and rugged rocks, forms an exquisite picture. A still finer and more extensive view is obtained from a sum-

mit called *Pointe de Combetta*, on the rt. of the path, and accessible in 1 hr. from the *Col de Ranzola*. Those who make the detour may find their way direct to Gressonay without returning to the mule-path. The descent from the col is in part rather steep, lying for some time through a pine-forest, and in 4 hrs. from Brussonne the traveller reaches Gressonay (Rte. D).

Travellers who fear to undertake the pass of the *Col d'Ollen*, described in the last Rte., will choose the easier but less interesting way to the Val Sesia by the *Col di Val Dobbia*. The ascent to the col commences a little below the village of Gressonay *St. Jean*, and is so well marked by a frequented mule-path that a guide is quite unnecessary. Except to the botanist, who will find a good many rare plants, the pass offers less of interest than most of those in this neighbourhood; yet the views of the Val de Lys from the W. side, and that of *Mont Blanc* from the top of the Col, are very fine. There is a small stone house or hospice at the summit, 8,250 ft. above the sea, where bread, eggs, and wine are to be had. On the E. side of the col the path traverses Alpine pastures and the remains of a pine forest before reaching a group of poor hovels, called *St. Grato*. The remainder of the descent lies along, or near to, the *Macagno* torrent, which in one place forms a fine waterfall. The glen narrows to a ravine before finally opening into the Val Sesia, close to the village of *Riva* (Rte. E). Going from W. to E., $3\frac{1}{2}$ hrs. suffice for the ascent, and $2\frac{1}{2}$ hrs. for the descent to *Riva*. In the opposite direction, 4 hrs. may be allowed to reach the Col, and 2 hrs. thence to Gressonay. Those who follow Rte. E down the Val Sesia may avoid *Riva*, joining the mule-track just below that poor village.

The very beautiful track down the Val Sesia offers the easiest, though a circuitous, way for reaching the upper end of the Val *Sermenta*, and the passes leading to the Val *Anzasca*. A moderate walker may easily push on

from Gressonay to Mollia, avoiding the wretched inn at Riva, or even to Scopa, 3 hrs. farther. About 2 m. below Scopa, at the hamlet of Balmuccia, is the junction of the *Val Sermenta* with the Val Sesia. This is sometimes called Val Piccola, in contradistinction to the main valley, called Val Grande. The scenery of the lower part is extremely beautiful. It is a narrow and tortuous glen, where trees, rocks, and Alpine torrents present in ceaseless variety the most exquisite pictures. A char-road has been for some time in progress. It is a walk of $2\frac{1}{2}$ hrs. from Balmuccia — passing on the way the village of *Buccioletto* — to

Rimasco, with a poor inn, where the traveller finds civility, but much dirt, and scanty provision for his support. Here the valley divides. The W. branch, noticed below, leads to Rima, while the way to Ponte Grande lies through the E. branch. The scenery continues very beautiful as far as *Carcoforo*, where the inn is rather better than at Rimasco. This is the highest village in the valley, and above it the slopes are bare, and the scenery rather tame. Mules take nearly $2\frac{1}{2}$ hrs. from Carcoforo to reach the summit of the *Col d'Egna* (7,388'), the track being rather steep, but the trouble is repaid by a magnificent view of Monte Rosa, and the minor ranges that diverge from it. The view is still more extensive from a point about 10 min. E. of the col. A rapid descent leads NE. in 1 hr. from the col to the *Barranca Alp*. This is reached close to the summit of the *Barranca Pass* (Rte. L), marked by a small oratory. The track here joins that leading from Fobello, in the Val Mastalone, to Ponte Grande. The *Barranca Pass* lies over an undulating plateau of Alpine pasture, and is but 5,749 ft. in height. On approaching the N. slope there is a beautiful view over the *Val Olloccia*, a tributary of the Val Anzasca, through which this route lies. At various points in the descent Monte Rosa comes into view. The way is steep, and rather trouble-

some for mules, and in places so ill-marked that it is easy to go astray. The Val Olloccia is reached in 1 hr. from the *Barranca Pass*. Much of the magnificent timber that clothed its slopes has of late years fallen before the axe. The track is carried along the l. bank of the torrent to *Bunio*, one of the chief villages in the Val Anzasca, most beautifully situated, but without an inn. It is a walk of but 15 min. hence to the bridge over the Anza, at *Ponte Grande* (Rte. F).

A glance at the map will show that the route above described, involving the descent of the Val Sesia from Riva to Balmuccia, and the re-ascent of the Val Sermenta to Rimasco, requires a long detour. This should be no objection to those who have not already seen the beautiful scenery of those valleys; but travellers who have already passed that way may be glad to vary their route by passing directly to the upper part of the Val Sermenta. This is particularly desirable for those who, having reached Alagna from Gressonay, and visited the grand scenery at the head of the Val Sesia, would reach the Val Anzasca by a more varied route than that of the Turlo Pass. Two passes lead from Alagna to Rimasco. The more direct of these, called *Bocchetta d'Alagna*, traverses the ridge S. of the peak of the Tagliaferro: information respecting it is desired. The other, probably easier, as it is more frequented, is called *Col de Moud*. This lies between the summits of the *Moudhorn* to N., and the *Tagliaferro* to SE. It is practicable for mules, but, as the way is rough, a pedestrian may pass in much less time.

Following the Val Sesia for a short distance above Alagna, the torrent is crossed to its l. bank by either the first or second bridge. The path then takes to the hill, and zigzags up the l. hand of two ravines, which are seen in front. Fine views of the summits of Monte Rosa from the Signal Kuppe to the Vincent Pyramide are disclosed on the l., and in about $1\frac{1}{2}$ hr. after quitting Alagna the Châlets de Moud are

reached. Excellent milk may be obtained here. The remainder of the route to the summit of the Col is comparatively uninteresting, and may be easily accomplished in 1 hr.'—[F. F. T.]

Mules take 3 hrs. to reach the summit, which is 7,467 ft. in height.

'The track leads down a snow-slope, beneath the rocks of the Tagliaferro, and on reaching the bottom the Val Sermenta is seen at a considerable depth below. Slopes of grass, interspersed with a rich growth of rhododendrons, are succeeded by a pine forest, through which the pretty path winds steeply down to Rima.'—[F. F. T.]

An active pedestrian need not employ more than 1 hr., if so much, in the descent, but mules require 2 hrs. *Rima* is a very poor, dirty village, with a German population, while the rest of the Val Sermenta is peopled by Italians. It is the last village in the W. branch of that valley, and to reach Carcoforo, at the head of the E. branch, it is necessary to descend to their junction at Rimasco. This is a walk of nearly 2 hrs., the Italian village of *Rima San Giuseppe* being nearly half-way.

A traveller wishing to visit the Pile Alp (Rte. E) may enjoy the grand scenery at the head of the Val Sesia, and reach Rimasco on the same day, without reascending near to Alagna. From the lower part of the ascent to the Turlo Pass a little-used track bears to the rt., and mounts to the *Col di Rima*, lying on the N. side of the *Moudhorn*. This leads into the head of the Val Sermenta, a little above the village of Rima.

Those who wish to reach Macugnaga directly from the Val Sesia may avail themselves of passes leading to that village from either branch of the Val Sermenta. The shortest and most interesting of these is by the *Bocchetta di Carcoforo*. The track diverges from the way to the Col d'Egua at the village of Carcoforo, $4\frac{1}{4}$ hrs. from Balmuccia. 'The ascent from Carcoforo is very steep; in ascending it takes more than 3 hrs. (in descending 2 hrs.) to

reach the summit. This commands a magnificent view of Monte Rosa and the Saas Grat. In descending there is a faintly-marked track along a steep slope until an abandoned mine (gold?) is reached. Below this the path descends into the short '*Val Quarazzola*, a branch of, or rather a recess in, the *Val Quarazza*, down which descends the path from the Turlo.'—[M]

By this pass a traveller, starting early in a char for Balmuccia, may reach Macugnaga on the same day. Time from Balmuccia, fully 10 hrs.' steady walking, exclusive of halts.

It is also possible to pass from Rima to the head of the Val Quarazza by a track which joins that of the Turlo (Rte. H). Further information as to most of the passes here noticed is much desired.

ROUTE K.

IVREA TO ORTA, BY BIELLA.

Tourists attracted by the grand scenery of the valleys radiating from the Italian side of Monte Rosa, have generally neglected the lower ranges that separate the plain of Piedmont from the ridges immediately connected with that great mountain. There is, however, ample room for interesting excursions among the exterior valleys of this region, which may well be visited at a season when the higher mountains are not easily accessible, or during intervals of bad weather, which is often confined to the immediate neighbourhood of the snowy Alps. A few days may be much better spent by a mountaineer amidst the beautiful scenery of the outer valleys of Piedmont, than in fretting in an Alpine inn, or plodding over a pass whose attractions are hidden by clouds, rain, or fresh snow. The present route is suggested with the hope of hereafter obtaining further information respecting the district which it traverses.

Ivrea (Rte. B) is not more than 10

or 11 m. in a direct line from Biella, but most of the routes commonly travelled are very circuitous. Both towns are connected by branch railways with the main line from Turin to Novara, but the trains are so arranged that $6\frac{1}{2}$ hrs. at the least are consumed in going from one place to the other. There is a country road by *Mongrande*, hilly, but tolerably direct, which is the best way for those who want to save time. If the weather be not too hot, the most agreeable way is to walk along the lower slopes of the hills, diverging a little to visit the sanctuary of *Graglia*. This stands on an eminence overlooking the plain of Piedmont, and is said to afford excellent head-quarters for visiting the neighbouring district. A large number of rooms are available for the use of strangers, except on a few days in the year when pilgrims resort here, and all available space is occupied. Tolerably good food is supplied at a restaurant adjoining the sanctuary. About 4 m. from hence is

Biella (Inns : *Corona*, best ; and several others), a thriving little town standing at the opening of the Val Andorno, whence the *Cervo* flows to join the Sesia, near Novara. The church of San Sebastiano deserves a visit. Travellers approaching Biella from Gressonay, or from the Val d'Aosta, may best avail themselves of one or other of the passes leading eastward from the lower part of the Val de Lys (Rte. D). The southernmost of these is the *Col de Corisey*, between *Lillianes* and *Graglia*. A little farther N. is the *Col de la Balma*, leading from *Fontainemoire* to the sanctuary of *Oropa*. This is about 6 m. NNW. of Biella, and, though at a considerable height, is reached by a good road. At certain times it is overcrowded with pilgrims. The church, containing some pictures by Gaudenzio Ferrari and Luini, is curious. The arrangements for receiving guests here are similar to those at *Graglia*. The highest village in the Val Andorno is *Piè di Cavallo*, connected with *Issime*, in the Val de Lys, by the

Col de Torion. At the head of the Val Andorno is the *Cima di Bò*, and at either side of the summit lies a path leading to the Val Sesia. The more frequented of these traverses the head of the valley of the *Sessera*, crossing two low passes before reaching *Scopello* (Rte. E).

The shortest way from Biella to Orta is by the road skirting the base of the mountains, which passes by *Cossato*, *Gattinara*, *Romagnano*, and *Borgomanero*, a distance of about 35 m. A more agreeable way is by *Mosso Sta. Maria*, reached from Biella by *Andorno*, and then by *Crevacuore*, near the junction of the *Sessera* with the *Sesia*. The lower valley of the *Sesia* is traversed at *Borgo Sesia* (Rte. E), where the pedestrian may find tolerable accommodation, and it is an easy walk thence to the shores of the Lake of Orta. The easiest way is by a low pass, amidst wooded hills, to *Gozzano*, on the main road from *Borgomanero* to Orta, about 4 m. from either place. It would, probably, be better to go direct to *Pella*, NE. of *Borgo Sesia*, crossing on the way a hill which must command a very fine view, and reach Orta by boat.

The *Lake of Orta* is, perhaps, the most attractive of the smaller lakes on the S. side of the Alps. It lies in a depression about 9 m. long, parallel to the S. branch of the *Lago Maggiore*, but is said to be 500 ft. above the level of that lake. The scenery of the shores combines richness with boldness of form, but does not offer the variety that characterises the shores of the greater lakes. The heights that surround it command views of extreme beauty, and the panorama from the *Monte Motterone* (§ 21, Rte. B) is celebrated as one of the finest in the Alps. The attractions of the lake are much enhanced by the picturesque island of *San Giulio*, opposite the town of *Orta*. This stands on the E. shore of the lake, on a rather steep slope. It is very well provided with hotels (*Albergo San Giulio*, chez *Ronchetti*, who speaks English—good and reasonable ; *Leone*

d'Oro, small but good, on the lake; La Posta, new and well situated). Boating is one of the chief amusements here. Hire of a boat, with one man, to Omegna, 2 fr. Mules are not easily had, but tolerably stout donkeys are commonly used for excursions. Charge (including the boy who leads the donkey), 10 fr. a day. The Monte Sacro, forming a rocky promontory projecting into the lake, is a sanctuary dedicated to S. Francesco d'Assisi, with numerous chapels arranged in imitation of the more famous Sacro Monte of Varallo (Rte. E). Though less remarkable as works of art, these well deserve a visit, and the views over the lake and the surrounding mountains are of great beauty. The Isola di San Giulio should not be omitted by a stranger. Besides the extreme beauty of the position, the old church, partly modernised, contains many objects of interest. Among the frescoes is one by Gaudenzio Ferrari, and others by Tibaldi, an antique carved pulpit, &c. Some bones of a whale are exhibited as remains of a monstrous serpent destroyed by S. Giulio, who retreated hither in the fourth century.

Orta is connected by a good road with Omegna (Rte. M) at the N. end of the lake, nearly 7 m. distant, and with Novara by *Borgomanero*. A new road leads to Arona (§ 21, Rte. A), the nearest railway station for Turin, Milan, &c. The distance is about 12 m., but the road is very hilly; the omnibus takes nearly 3 hrs., and carriages not much less time.

ROUTE L.

ORTA TO PONTE GRANDE, BY THE VAL MASTALONE.

(About 36 Eng. miles.)

There is no way of approaching Monte Rosa which combines such a succession of beautiful scenery, constantly increasing in grandeur, as those described in this and the following

Rtes. The Val Mastalone opens into the Val Sesia at Varallo (Rte. E), and it is better to sleep at that place rather than attempt to reach Ponte Grande from Orta in one very long day.

The way from Orta to Varallo is to cross the lake to *Pella* on the W. shore, where donkeys are kept in readiness for those who wish to ride over the *Col di Colma*, as the low ridge is called which separates the lake from the valley of the Sesia. An active pedestrian may easily accomplish the distance in 4 hrs., but it is a pity to hurry through the exquisite scenery that accompanies the traveller throughout the whole distance. The ascent is rather steep, partly amid vines and fruit-trees, and in part under the shade of magnificent chestnut-trees. Masses of granite rock, often partially decomposed, project here and there from the side of the mountain, and add wildness to the scene. The upper part presents glades of smooth turf that rival the finest park scenery, but the summit is an open down, covered with meagre heather. This is reached in little more than 2 hrs., and from a slight eminence to the l. the snowy peaks of the Rosa range, the Mont Combin, and (as some think) the Monte Viso, may be descried. In descending, the glimpses of the Val Sesia, richly planted, and crowded with comfortable-looking villages and brightly-painted churches, are not less charming than those on the opposite slope. A new road leads down the slope of the hill, and joins the high-road half a mile below *Varallo* (Rte. E).

The *Val Mastalone* joins the Sesia close to the town, and there is a good carriage-road open for about 8 m. to Ferrera, and probably this year (1863) to Fobello. Nature, which has done so much to adorn this region, seems to have surpassed herself here. The most exquisite combinations of rock, and wood, and water succeed each other throughout the valley. In one place, about 3 m. from Varallo, it is contracted to a mere gorge, and a stone

bridge of a single arch, too narrow for carriages, spans the torrent. Another bridge has given a passage to the new road. About a mile above *Ferrera* the valley divides. The E. branch mounts to *Rimella*, where there is a poor inn. This leads to the Val Strona (Rte. M), and also offers the most direct way to the Val Anzasca, but the scenery is said to be inferior to that of the W. branch, which is generally preferred. Keeping to the l. at the fork of the valley, a walk of $\frac{1}{2}$ hr. leads to *Fobello*, where there is a country inn very well spoken of, and supplying better food than usual. The low ridge of the *Barranca Pass* (5,749') closes the head of the valley. The ascent is easy and short, but not very interesting, the slopes on either side being gentle and bare of trees. At a small oratory, reached in 2 hrs. from Fobello, this path joins that from the Col d'Egua, described in Rte. I. The view towards the Val Anzasca and the Monte Rosa, though very beautiful, do not equal those from the Col d'Egua or the Col di Campello (Rte. M). Ponte Grande is reached in 3 hrs. from the Barranca Pass. See Rte. I.

ROUTE M.

ORTA TO PONTE GRANDE, BY THE VAL STRONA.

The *Val Strona*, of which it is enough to say that it is worthy to compete with the tributary glens of the Val Sesia, pours its torrent into the stream that drains the Lake of Orta just as this flows out close to *Omegna* (Inn not comfortable, and charges unreasonable). Like most of the neighbouring valleys, this is narrow and sinuous, and richly wooded, giving constant variety of scenery but no distant views. The path is rough and sometimes rather steep, and nearly 5 hrs. must be allowed to reach *Campello*, the highest village. Scanty refreshment is to be had at an inn of the poorest

class, or else this might well be made a stopping-place by travellers. One path leads hence to the Val Anzasca, passing a col to the N. of Campello, and descending by the *Val Serpiano*, which opens about half-way between *Calasca* and *Castiglione* (Rte. F). Another track mounting immediately from the village a little S. of W., leads to the *Col di Campello* (about 6,000'?). This commands one of the finest distant views of Monte Rosa, and well rewards the somewhat laborious route which the traveller has followed from Omegna. The descent leads down to *Rimella*, the highest village in the E. branch of the Val Mastalone (Rte. L); but the editor is informed that there is a way leading to Ponte Grande, either bearing to the rt. from the track to Rimella, or passing the ridge at a point farther N. than the Col di Campello. Further information is desired.

[A very interesting way from Omegna to Varallo is by the village of *Quarna*, and then over the *Monte Mazzuccone* to *Camasco*. This mountain is rather higher than the Motterone (§ 21, Rte. B), and Monte Rosa is some miles nearer, but it misses in great part the beautiful views over the lakes that have obtained for its rival the title of the Italian Righi. 7 or 8 hrs. should be allowed for this route from Omegna to Varallo.]

ROUTE N.

VISP TO MACUGNAGA, BY THE MONTE MORO.

	Hrs.' walking	Eng. miles
Stalden . . .	1 $\frac{1}{2}$	5
Saas . . .	3 $\frac{1}{2}$	10
Mattmark See . .	3	8 $\frac{1}{2}$
Monte Moro . . .	2	5
Macugnaga . . .	4	8
	14	36 $\frac{1}{2}$

In the preceding portion of this section we have supposed the traveller to approach the Monte Rosa by the western branch of the valley of the Visp, or else from the side of Italy. There

remains another route, in grandeur of scenery vying with any of those hitherto described, by the eastern branch of the Visp, best known as the Saasthal. For those who intend to make a complete tour of the entire district, commencing and concluding on the side of Switzerland, the best arrangement is to begin with the present route, and after passing some time in the Italian valleys to reach Zermatt by the Col de St. Théodule. The experience and training acquired in the course of a month thus spent will enable the traveller to conclude the tour by one or other of the high passes described in the two following Rtes. It is unfortunate for travellers that there is as yet no inn in the valley of Saas worthy of its natural attractions, or comfortable enough to tempt visitors to establish there their head-quarters.

The path through the valley of Saas is practicable for mules nearly to the top of the Monte Moro Pass. The charge at Visp for a mule to Saas is 20 fr.—exorbitant; from Saas to the Monte Moro, 10 fr.

The way from Visp to Stalden is described in Rte. A. Above the latter village a path turns to the l. from the more frequented track to St. Niklaus, crosses the Kinnbrücke, a single arch, 150 ft. above the Gorner Visp, and entering the E. branch of the valley mounts rapidly along the l. bank of the Saaser Visp. The valley narrows to a defile between steep and high mountains, whose summits are not seen from below, and scarcely a house is met till the track, in 2 hrs. from Stalden, reaches a little green plain where stands the village of *Balen*, at the base of the Balfrin or Balenfirn. The path here crosses to the rt. bank of the Visp, and the valley widens out a little so as to show some of the neighbouring peaks. In 3½ hrs.' steady walking from Stalden the traveller reaches *Saas*. For some years past there have been two inns here, but they have undergone many vicissitudes, and one or other has at various times been closed. The Hôtel

du Mont Rose was for some time well conducted by Franz Andermatten with one or two associates, but the latest accounts, in 1862, were less favourable. The rival Hôtel du Mont Moro was tolerably well kept in 1862, and very reasonable. The inn at the Mattmark See, better situated for many excursions, is now improved. Franz Andermatten is an excellent guide, and Moritz Zurbrücken and J. Venetz, also of Saas, are well spoken of. The former priest of the parish, Herr Imseng, is renowned as an intrepid mountaineer, and is well known by name to the readers of Mr. Wills's 'Wanderings among the High Alps.' The village of Saas, 5,267 ft. above the sea, does not command very striking views, but is situated in the immediate neighbourhood of scenery of the first order, and is a centre whence the traveller may undertake many excursions of the utmost interest. Most of these are included among the passes described in the two following routes, and in § 21. Those who do not undertake any of these rather difficult expeditions should on no account omit to visit the valley of *Fee* and the *Gletscher Alp*. The upland valley of Fee, whose existence is scarcely suspected by a traveller passing along the main valley, lies in a recess in the range of the Saas Grat, whose highest peaks rise in a grand amphitheatre round the Fee Glacier which fills the larger part of the valley. Below it are the pastures belonging to the hamlet of Fee, a short distance SW. of the village of Saas. The Glacier is divided into two large branches by the Gletscher Alp, a mass of rock rising in the midst of the ice. The view from the hamlet of Fee is already very fine, but to form an adequate idea of the grand scale on which Nature is here exhibited, travellers are recommended not only to reach the Gletscher Alp, but to ascend to its highest point, a distance of about 3½ hrs. from Saas. It is possible to attain the lower part either by passing between the two arms of the Glacier, or by keeping to the rt.

above Fee, and crossing the N. arm to the foot of the rocks. In some seasons the two branches have approached so nearly together that in passing between them there has been risk from blocks of stone detached from the surface of the ice on either hand; but during the last few years the ice has retreated. Facing the range of the Saas Grat, the three highest peaks of the Mischabelhörner, all exceeding 14,000 ft., form the rt. side of the amphitheatre; to these succeeds the flattened summit of the Alphubel (13,803'), and the depression forming the Alphubel Pass (Rte. O), followed by the Allaleinhorn (13,235'). The latter peak throws out a great spur terminating in the Mittaghorn, which encloses the valley of Fee on the S. side and completes the circuit. Another interesting excursion from Saas is to the Trift Alp, about $2\frac{1}{2}$ hrs. above the village on the E side of the valley. The view of the Saas Grat, which is the main object of the excursion, is, however, equally fine from many other points on the same side.

The path from Saas to the Monte Moro lies all the way along the rt. bank of the Visp. The scenery is wild, and in part dreary, but at intervals the eye is relieved by grand views of the surrounding peaks and glaciers. The first village is *Almagell*, nearly at the limit of tree-vegetation, at the junction of the *Lehmbach* with the Visp. This torrent, which has a fine waterfall some distance above the village, leads to the Zwischbergen Pass (§ 21, Rte. D). Little more than a mile farther the more considerable torrent from the *Furgge Thal* descends to join the Visp by the pastures of *Zmeigeren*. Beyond this the scenery increases in wildness, and the vegetation becomes more decidedly Alpine; the path mounts, but not very rapidly, and at length, in nearly 3 hrs. from Saas, the traveller overlooks the *Mattmark See*. This small lake has been formed by the accumulation of the waters of the Visp behind the *Allalein Gletscher*, which, like that of Miage in the Allée Blanche,

has dammed the valley across. The lake is kept within moderate limit because the waters find an exit beneath the bed of the glacier. The very rare *Pleurogyne carinthiaca* is found in grassy spots near the lake. On the alp S. of the Mattmark See, a small inn has been opened within the last few years. There were at first complaints of the management, but it is said to be now much improved. Being nearer to many of the passes, hereafter described, than Saas, it is often found a more convenient stopping-place. This holds especially in regard to the Monte Moro, which is thus reached at an early hour, and the chance of a clear view from the top thereby much increased. At no great distance from the inn are the chalets of the *Distel Alp*. Amidst wild and dreary scenery the ascent continues by a tolerable mule-path, and in some spots the remains of an ancient paved track attest the former importance of the pass. In most places it has been carried away or buried beneath débris. On reaching a moderately steep snow-slope, if not sooner, the mules are left behind, and a short ascent leads to the summit of the *Pass of Monte Moro*. Many of the passes described in this section may tempt more than this does the adventurous traveller who loves the flavour of difficulty, not to say danger, but there is perhaps none which offers a scene of such surpassing grandeur as that here unrolled before his eyes, and none certainly that deserves a preference. The eastern face of Monte Rosa, with the continuous range of precipice that extends to the Weisssthor, is here seen from the most favourable point of view, and the beautiful peak of the Pizzo Bianco on the opposite side of the basin of Macugnaga completes the wonderful picture. According to the Swiss Federal map, the height above the sea of the cross marking the summit is 9,390 ft.

It is well worth while to ascend a point E. of the summit of the pass, called the *Joderhorn*. The view of Monte Rosa is not finer, for, in truth,

that cannot be surpassed, but the eye is enabled to contrast it with the distant view over the plain of N. Italy and the southern ranges of the Alps. Without going so far, you may extend the range by mounting the rocks behind the wooden cross, whence you gain the view of Monte Rosa on one hand, and of the whole extent of the Sass valley on the other.

The descent to Macugnaga is long, and for a pass so frequented, very steep; but the view which remains before the traveller's eyes suffices to prevent the way from becoming tedious. The lower half of the slope is less rapid, and on approaching the valley some scattered pines represent the remains of the forest that once covered the valley. From 3 to $3\frac{1}{2}$ hrs. are required for the descent, but $4\frac{1}{2}$ hrs. are usually employed in reaching the pass from Macugnaga.

It is scarcely necessary to say that the name Monte Moro applies to the pass, and not to any of the neighbouring summits. All the ancient passes of the Alps received similar designations, while distinct names for separate peaks were not recognised by travellers or geographers till a much later date. The name of this pass, and the words *Mischabel*, *Allalein*, *Almagell*, &c., all point to an early occupation of this route by the Saracens, who are known to have attempted to penetrate into Switzerland by several of the passes of the Pennine chain.

ROUTE O.

SAAS TO ZERMATT, BY THE SAAS GRAT.

The range of the Saas Grat, extending from the Strahlhorn to the Balferin, ranks next in height to those of Mont Blanc and Monte Rosa, and the four passes leading to Zermatt, as well as the Ried Pass described in the next Rte., may be counted amongst the most considerable in the Alps, not to be attempted except by men in thorough

training, with good guides, and in settled weather.

1. *Mischabel Joch*. This, the most northerly of the passes from Saas to Zermatt, has apparently been crossed but twice, and is so difficult that it can scarcely be recommended to future travellers. The passage was effected in 1862 by Messrs. H. B. George, C. and W. Trotter, and Thomason, with Christian Almer and Peter Bohren, of Grindelwald, and two Saas porters. Having followed the usual course to the Alphubel Joch (see below) for about 4 hrs. from Saas, Mr. George and his companions turned to the rt., and ascended a steep ridge of rocks and several snow-slopes, keeping to the l. of the ice-fall which descends from the basin below the col, and ascending almost direct towards the summit of the Alphubel. When they had reached a height about 300 ft. below the col, they turned again to the rt., and made their way nearly at a level till they were able to cross the bergschrund, above which a short steep ice-slope led (after cutting 180 steps) to the summit of the pass. This lies between the Täschhorn and the Alphubel, but nearer to the latter, and is probably about 12,800 ft. in height. $8\frac{1}{2}$ hrs. from Saas were employed in the ascent.

The descent lies over the small *Weingarten Gletscher*, which falls very steeply on the W. side of the Alphubel. The rocks on either side were so unpromising that Christian Almer, the leader, preferred to descend by the ice-fall of the glacier. This rather difficult operation led the party in less than 2 hrs. from the pass to a stony tract, followed by grass slopes, ending in the Täsch Alp, and a path (mentioned below) conducted the travellers thence to Zermatt in $3\frac{3}{4}$ hrs. from the foot of the glacier. Examined from below, the rocks enclosing the Weingarten Glacier appeared quite impracticable, leaving no other way than by the steep and broken ice-fall. Later in the same season the pass was effected in the opposite direction by a

party under the guidance of F. Lochmatter.

2. The most direct way from Saas to Zermatt is by the *Alphubel Joch*, SE. of the Alphubel. It was first discovered by the Rev. Leslie Stephen, one of the most energetic and successful explorers of this portion of the Alps, who has given in 'Vacation Tourists' an account of the difficulties encountered in effecting the descent to the Täsch Glacier.

Having gained the summit of the Gletscher Alp above Fee (see last Rte.), a rocky ridge is seen to descend from the Alphubel, being probably a continuation of the same ridge. A little to the l. another ridge, nearly parallel to the first, descends from the direction of the pass lying between the Alphubel and the Allaleinhorn, SSW. of the traveller's position. The natural course is to follow the line of the second ridge, which leads by 'a long narrow snow-valley, or rather shelf,' to the lowest point (12,474'—Fed. Engineers) in the range connecting the two above-named summits. In making this pass it is important to hit the lowest point in the ridge, or true col. This is connected with easy snow-slopes that fall to the westward till they reach the verge of a steep rocky escarpment. Here it is necessary to bear to the l., when the precipice gradually diminishes in height, and the descent to the glacier is quite free from difficulty. By striking the ridge too far S. on the first passage of the Joch, Mr. Stephen and his companions were led to seek a way over the summit of the Allaleinhorn.

Another course was afterwards discovered by Mr. Stephen. From the top of the Gletscher Alp he directs travellers to follow the ridge descending from the Alphubel, keeping close under the rocks, and on reaching the watershed to bear as much as possible to the rt., or towards the Alphubel. From the point reached on the shoulder of the Alphubel, about 250 ft. above the actual pass, the descent is said to be perfectly easy. It lies over a small

secondary glacier, leading down to grassy slopes connected with the Täsch Alp, which is reached by following the stream from the small glacier. Neither the Täsch Glacier nor its moraine is touched in following this route. There is a foot-path through the pine forest from the Täsch Alp to Zermatt, carried for a considerable distance along a watercourse. It joins the main track of the valley a short distance below the bridge over the Visp between Täsch and Zermatt. In taking the pass from Zermatt, the stream leading to the secondary glacier is the second on the l. hand in ascending the Täsch valley.

From 10 to 12 hrs., exclusive of halts, must be allowed for this pass, according to the state of the snow.

The summit of the Alphubel was reached by Mr. Stephen in 2 hrs. from the col. The view is not much more extensive than that already seen from the pass, which includes the Bernese Oberland and the grand circuit of peaks surrounding Zermatt, but in ascending the peak the *séracs* are described as exceedingly grand.

This pass is known to Melchior Anderegg, Peter Perrin, Johann Kronig, J. J. Bennen, Victor Tairraz, and probably to several of the Zermatt guides.

3. *Allalein Pass*, or *Täsch Joch*. This, though rarely used, was long known as the only pass connecting Zermatt with the head of the valley of Saas. Like that next described, it is more easily taken from the Mattmark See than from Saas, but being far inferior in scenery to its rivals, and a less direct way from Saas than the Alphubel Joch, it is not likely to be henceforward much frequented.

The *Allalein Glacier* originates in a snow-basin lying between the Strahlhorn and the Allaleinhorn, but the principal part of the ice-stream sweeps in a curve convex to the N. under the steep SE. side of the latter peak. The Rympfischhorn, which stands a little W. of the line joining the above-named summits, also contributes the snows of

its E. slope to the upper reservoir. The ice-stream not only descends to the level of the main valley, but, as mentioned in the last Rte., it bars the channel of the Visp and forms the Mattmark See.

The ascent to the Allalein Pass is commenced by the steep slopes of a ridge projecting eastward from the Strahlhorn, whose two summits are sometimes called respectively Inner and Ausser Thurm. After ascending for about $2\frac{1}{2}$ hrs. it is necessary to cross the upper basin of the glacier, and it is usual to make a considerable sweep by its northern edge, under the Allaleinhorn, in order to avoid the great crevasses which occupy the centre. When the snow is in good order $4\frac{1}{2}$ hrs. from the inn suffice to reach the summit of the pass, 11,654 ft. in height, and therefore considerably lower than any other pass from Saas to Zermatt. It is sometimes necessary to take a very circuitous course over the upper part of the glacier, and when the snow is in bad condition the ascent may take 6 or 7 hrs. The view, although it includes some grand objects, is far more limited than that from either of the preceding passes, or from the neighbouring Adler Pass. The most striking object is the craggy peak of the Rymfischhorn (13,790'), which from this side appears utterly inaccessible. In the opposite direction is the summit of the *Allaleinhorn* (13,235'), reached for the first time in 1856 by Mr. Ames, guided by Franz Andermatten. The ascent lies along a sharp ridge, in some places rather difficult, and nearly 2 hrs. are required for the ascent from the pass. The view is, of course, very fine, and well deserving the extra labour; but considered as the object of an independent expedition it is not nearly equal to that from the adjoining and higher peaks of the same range, that from the Strahlhorn being pre-eminent. The descent by the *Täsch Glacier* is free from difficulty. There are some concealed crevasses which the guides often avoid by taking to the rocks. There is, however, no-

thing to prevent a party properly tied together from making nearly the entire descent by the *névé* and glacier, until this is left a short way above the *Täsch Alp*, whence, as already mentioned, a path through the forest leads to Zermatt, which may thus be reached in 9 hrs., exclusive of halts, from the Mattmark See.

4. *The Adler Pass.* This, perhaps the most interesting of the passes connecting the valleys of Saas and Zermatt, was discovered by M. Imseng, the *curé* of Saas, and is well described by Mr. Wills in his interesting volume called '*Wanderings among the High Alps.*' When possible, it is a better plan to make the ascent from the Zermatt side, as the difficulty of cutting steps in the descent of the ice-slope is greater than in ascending.

The first part of the way from the Mattmark See is by the same ascent that leads to the Allalein Pass. That pass lies over the NW. corner of the quadrangle enclosing the head of the Allalein Glacier, while the Adler Pass crosses the SW. corner of the same enclosure, between the Strahlhorn and the Rymfischhorn. The course across the upper slopes of the Allalein Glacier is free from serious difficulty, but sometimes troublesome from the softness of the snow and from concealed crevasses. The summit of the pass (12,461'), usually reached in about $4\frac{1}{2}$ hrs. from the Mattmark See, commands one of the grandest views in this district, and is interesting not only for the distant objects in view, but also for the striking position in which the traveller finds himself, separated from the upper part of the Findelen Glacier by an ice-slope so steep as to occasion some involuntary anxiety to those who pass for the first time.

Before undertaking the descent, most travellers who are favoured by clear weather are tempted by the aspect of the adjoining peak of the Strahlhorn (13,750'), easily reached in 1 hr., or even less, by a moderately steep snow-slope, and commanding one of the most mag-

nificent panoramic views in the Alps. Though a few feet lower than the Rympfischhorn or the Alphubel, it is better situated, the view to the E. and S. being comparatively clear of obstruction, and it is hard to point out a rival view in which all the elements that make up the grandeur of Alpine scenery are so perfectly combined. The return to the col may be made in $\frac{1}{2}$ hr.

The descent from the Adler Pass usually requires all the skill of practised ice-men, and at times, when fresh snow lies upon the ice-slope, it cannot be undertaken without unavoidable danger. The slope, which usually consists of hard ice, rests against very steep rocks descending from the Rympfischhorn, too smooth to offer hold for feet or hands. An ample supply of good rope and two ice-axes should be at hand as security against accidents. The descent is generally made close to the rocks, and owing to the difficulty of cutting steps in so steep a declivity it usually takes longer time than when the ascent is made from the Zermatt side. The distance is fortunately not great, and from $\frac{1}{2}$ hr. to $\frac{3}{4}$ hr. generally suffices to land the travellers on the head of the Findelen Glacier. The NE. corner of this glacier, lying below the ridge of the Rympfischwäng, is much broken, and care and experience are requisite to thread the way through the intricate network of crevasses. Some previous study of the surface as viewed from above may save time in this part of the route. From 1 hr. to $1\frac{1}{2}$ hr. usually suffices to set the traveller clear of these last difficulties, and then the way lies for about $\frac{3}{4}$ hr. more either on the moraine or along the N. side of the glacier. This is finally quitted when easier footing is obtained on the rt. bank, and the descent to Zermatt continues by the Flüh Alp and the beaten track descending thence to Zermatt. The steep ridge of the Rympfischwäng separates the Findelen from the Täsch Glacier, and offers the only way yet found to reach the peak of the Rympfischhorn. As this ascent cannot conveniently be

combined with any of the passes here described, it is noticed amongst the excursions from Zermatt, Rte. A.

When taken from Zermatt to the Mattmark See this pass may usually be made in 9 hrs., exclusive of halts, and some active mountaineers have accomplished it in 8 hrs. In the opposite direction not less than 10 hrs. should be allowed. When the pass is made to or from Saas, instead of the inn at the Mattmark See, time is saved by avoiding the latter, and crossing diagonally the lower end of the Allalein Glacier, so as to reach the main track through the Saas Thal just where it leaves the side of the glacier.

In going from the Adler Pass to the Riffel Hotel, travellers may either pass by the E. side of the Stockhorn to the head of the Gorner Glacier, or cross the rocky tract N. of the Gorner Grat from the l. bank of the lower Findelen Glacier.

Besides the four passes already described, Zermatt may be reached from the Mattmark See by the Schwarzberg Glacier and the New Weiss Thor, as mentioned in Rte. F. This is, by many degrees, the easiest and most direct way for reaching the Riffel Hotel from the head of the valley of Saas.

ROUTE P.

SAAS TO ST. NIKLAUS, BY THE RIED PASS.

This interesting pass was discovered by Professor Ulrich, but has been rarely used, probably because the frequented mule paths through both branches of the Visp valley offer a much easier and shorter mode of communication. The editor has been favoured with an account of the pass by the Rev. Leslie Stephen.

It has been already mentioned (Rte. A) that the range of the *Mischabelhörner* includes four summits. Reckoning from S. to N., these are the *Täschhorn* (14,758'), the *Dom* (14,935'),

a third nameless and little prominent point (14,108'), and a fourth, sometimes called *Gasenriedhorn* (14,219'). The two latter are collectively called *Nadelgrat*. N. of the *Nadelgrat* the ridge of the *Saas Grat* sinks considerably, and the next summit, NE. of the *Gasenriedhorn*, is the *Ulrichshorn* (12,891'), sometimes called *Klein Mischabelhorn*; the last high summit, due N. of the last, is the *Balferin* (12,402'). The *Ried Pass*, lying between the two last-mentioned peaks, gives access from *Saas* to the head of the *Ried Glacier*, descending NNW. from the *Nadelgrat*. A ridge sinking rapidly towards the valley of *Saas* projects to the eastward from the *Gasenriedhorn*, having on its N. side the *Bider Glacier*, and on the S. the small *Hochbalm Glacier*, whose torrent joins that from the *Fee Glacier*. Access to the pass has hitherto been obtained only by crossing the upper part of this ridge from its S. base near the hamlet of *Fee*. Following up the course of the stream, and keeping along the NE. bank of the *Hochbalm Glacier*, it is easy to reach the higher *névé*, which must be crossed towards the angle of the glacier immediately under the *Ulrichshorn*. A snow couloir will then be found to lead up to the highest point in the ridge already mentioned. By this couloir, or by the rocks beside it, the traveller gain the ridge and looks down upon the *Bider* and *Hochbalm Glaciers*. Turning up this ridge to the point where it diverges from the main chain, a little N. of the peak of the *Ulrichshorn*, he reaches the edge of a broad level plateau of *névé*, dividing the latter mountain from the *Balferin*.

'It took us a good $\frac{1}{2}$ hr. of fast walking on hard snow to cross this, which we did, keeping well to our left under the rocks of the *Ulrichshorn*. Here, as the *Ried Glacier* began to sink towards the NW., we were obliged to leave it and keep to the W. along the lower slopes of the *Nadelgrat*, somewhat helped by old avalanche snow, and once endangered by falling

stones. There is considerable difficulty at the point where the great glacier fall occurs. It is necessary to leave the bank of the glacier, keeping over a small secondary glacier which lies on the slope of the *Nadelgrat*, after crossing which a steep couloir will be found leading to the lower plateau of the *Ried Glacier*. This couloir, however, is impracticable in its upper part, and it is necessary to descend by the rocks on its right (or eastern) bank. They look at first difficult, but are in fact pretty easy. On reaching the foot of the couloir the grass slopes on the W. bank of the glacier are soon reached. A little lower is the *Schallbet Alp*, whence there is a path to *St. Nicolas*. The vast dimensions of the *Ried Glacier* will surprise those who pass here for the first time. It is possible to climb the *Ulrichshorn* or *Balferin en route*. The weather was too uncertain for us to do so. Time required, 5 hrs. ascending from *Saas*, and 5 hrs.' descent to *St. Niklaus*. *Melchior Anderegg*, *Johann Kronig*, of *Zermatt*, *Franz Andermatten*, and *Franz Lochmatter*, of *Macugnaga*, all know the pass.

'The route laid down on *Studer's* map principally differs from this in placing the track along the NE. bank of the *Ried Glacier*. I believe our route was the best. The pass is very interesting in showing the interior of the *Mischabel* range, which is invisible in other directions.'—[L. S.]

SECTION 21.

SIMPLON DISTRICT.

BETWEEN the valley of *Saas*, described in the last section, and the *Pass* of the *Simplon* is a very considerable mountain range, parallel in its general direction to the *Saas Grat*, and important enough in any other neighbour-

hood than that of Monte Rosa to attract mountaineers. After a long period of neglect, this fine range has of late years excited the attention of several travellers, and it has now been partially explored, though there is doubtless scope for many new and interesting expeditions. From the *Joderhorn*, near Macugnaga, to the N. peak of the *Fletschhorn*, the range in question forms the watershed between Switzerland and Italy. N. of the above limit the chain forks, and two parallel ridges of no great height, enclosing between them the *Gamsen Thal*, descend towards the Rhone. At its N. end the range is high, and so steep that the road of the Simplon and the valley of Saas are in some places not more than 7 m. apart. Farther S. the summits are lower, but the range throws out considerable branches to the E., which enclose the valleys of Antrona and Bugnanco.

It is convenient to include in this district the nearly isolated mass crowned by the peak of the Monte Leone, which is enclosed on two sides by the road of the Simplon, and on the third by the Val Cherasca.

ROUTE A.

MARTIGNY TO ARONA—PASS OF THE SIMPLON.

	Swiss leagues	Eng. miles
Sion (by railway) . . .	5 $\frac{1}{2}$	16 $\frac{1}{2}$
Sierre (by road) . . .	3 $\frac{1}{4}$	9 $\frac{1}{4}$
Turtman	3	9
Visp	3	9
Brieg	1 $\frac{3}{4}$	5 $\frac{1}{4}$
Berisal	3	9
Simplon	5	15
Isella	3	9
Domo d'Ossola . . .	3 $\frac{1}{2}$	10 $\frac{1}{2}$
Vogogna	3	9
Ornavasso	2 $\frac{1}{2}$	7 $\frac{1}{2}$
Baveno	2 $\frac{1}{2}$	7 $\frac{1}{2}$
Arona	4	12
	—	—
	43	129

Four trains daily from Bouveret to Sion in 2 $\frac{1}{4}$ hrs., taking passengers by the Ouest Suisse line at the St. Maurice

Junction. Diligence from Sion to Arona once daily in 24 hrs. Fares: coupé, fr. 35.50; interior, fr. 29.80. This vehicle starts from Brieg at 6.30 A.M., and reaches Domo d'Ossola at 7 P.M. It is, therefore, a good plan to reach Brieg on the preceding evening, either by char, or by a diligence which plies daily between Sion and Brieg. A two-horse carriage from Sion to Brieg may be hired for 40 or 50 fr.; from Brieg to Domo the charge is from 80 to 100 fr., with a *bonnemain*. This should include all charges for extra horses engaged to assist in the ascent. Pedestrians who may avail themselves of the diligence to send their heavy luggage across the Alps, while they follow some less convenient route, should not forget to send the key of each article fastened outside, as otherwise it will be detained at the Italian custom-house.

We include in this route the greater portion of the celebrated road designed by Napoleon to connect France and Italy by way of Geneva and Milan, which continues to be one of the main lines of communication across the Alps, and one of the most interesting for those who are condemned by infirmity or indolence to keep to carriage-roads. The original road was carried along the S. side of the Lake of Geneva (§ 17, Rte. I), and then by the l. bank of the Rhone to Martigny. It was then conducted through the valley of the Rhone to Sion, and thence to Brieg. The main difficulties and the heaviest expenditure were encountered in traversing the pass between Brieg and Domo d'Ossola, especially in the descent on the Italian side. From Domo d'Ossola the course selected was along the valley of the Tosa, and, after some doubt as to the relative advantages of a line by the Lake of Orta or by the Lago Maggiore, the latter was ultimately selected, and the road was carried past Arona to Sesto Calende at the S. end of the lake, and thence across the plain to Milan. The extension of railways and steamers has reduced to secondary importance the portions of the line between

Geneva and Sion, and between Baveno and Milan; and though the works on the rly. between Sion and Brieg have been partially suspended, it is probable that the only part of the original road which will long continue to serve for general traffic is that between Brieg and Baveno. Although the works on this line have been equalled, and even surpassed, during the last half century, especially on some of the great Austrian roads, such as the Stelvio, this continues to be a remarkable monument of skill and labour, owing to the great difficulties that were successfully encountered in making the road. It happens, unfortunately, that the narrow gorge through which it was necessary to conduct the descent towards Italy is peculiarly exposed to the effects of storms and heavy rain. The road has in consequence suffered serious damage, and large portions have at different times been carried away, so that the sums expended for maintenance and repairs during the last 50 years have borne a large proportion to the original cost, which was nearly £700,000. The breadth of the road is nowhere less than 25 ft., and the slope rarely exceeds 1 in 15. To give an idea of the amount of work involved in making such a road, it is said that between Brieg and Sesto Calende it crosses 613 bridges of various dimensions.

The way from Geneva to Martigny is described in § 18, Rte. A. The valley of the Rhone between that place and Sion is so devoid of picturesque interest, that most travellers are glad to hurry over it in the rly. train. On either side of the valley mountains of uniform slope and hue, just high enough to conceal the great ranges of the Pennine and Bernese Alps, hem in the valley, whose bed is so nearly level that undrained swamps extend afar, and at some seasons make it unhealthy as well as unsightly. The geologist, who sees in these appearances the record of the processes that have fashioned the mountains and the valley, will not find the way irksome. The uniformity of the

slopes and the absence of salient points are here due to the passage of a vast glacier through a trench in the yielding carboniferous strata, and this immense planing tool has left its mark permanently impressed on the face of the country.

Near the first station on the rly. from Martigny are the mineral waters of *Saxon*, containing iodine and bromine, and deemed very efficacious in skin complaints. The site is not attractive, but the establishment is handsomely fitted up. Pension, 5 fr. a day. The next station is *Riddes*. Looking back, there is a fine view of the Grand Moevran (10,044') (§ 22), while to the N. the *Haut de Cry* (9,698') is a striking object. The rly. crosses to the rt. bank before reaching the next station, *Ardon*, near the opening of the Val de Lizerne, through which lies the way to the Pas de Cheville (§ 22). About 4 m. farther is

Sion (Inns : Poste ; Lion d'Or—both good), the ancient capital of the Valais (1,732'), whose former importance is told by the massive style of the houses of many of the old families of the place, and by the ruins of several castles. The monotony of the valley of the Rhone is here broken by some masses of rock that rise abruptly in the midst, and are crowned by three castles, greatly enhancing the picturesque appearance of the town. These buildings contain many remains of antiquity, commencing with the Roman period, but they chiefly tell of the period when the Bishops of Sion reigned as secular princes over the Valais. In going to visit these buildings the traveller is first conducted to the *Majoria*, once the residence of the majors, or governors, of the Valais, now inhabited by the bishop and canons. Passing a very ancient All Saints' Chapel, he next reaches the *Tourbillon*, a ruined castle picturesquely placed on a steep rock, seen to the l. in approaching the town from Martigny. This commands a very fine view up the valley of the Rhone, with the snowy Alps of the Lötschen

Thal in the background. The third and most ancient castle is called *Valeria*, and now serves as an ecclesiastical seminary; it is said to have been originally the Roman *Prætorium*. This edifice includes the old cathedral, a curious specimen of the Early Pointed style, with a very perfect rood-loft of the 13th century, a chapel dedicated to St. Catharine (said to date from the 9th century), and some ancient frescoes. The view from this castle extends down the valley of the Rhone, including, in the background, the Diablerets, the Dent de Morcles, &c.

‘There is a comfortable *pension* 2 min. walk from Sion, kept by Madame Muston, late landlady of the Lion d’Or.’—[M.]

The flora of this part of the valley is remarkable for the presence of many species characteristic of the Mediterranean region, some of which, such as the pomegranate, have probably been introduced by man, but others are of spontaneous growth. Among those more interesting to the botanist may be enumerated, *Eruca sativa*, *Bufoia tenuifolia*, *Ononis Columnæ*, *Genista radiata*, *Cytisus nigricans*, *Trigonella monspeliaca*, *Telephium Imperati*, *Centaurea Crupina*, *Ephedra distachya* (on the rocks below the castle), *Iris lutescens*, *Tulipa oculus solis*, *Malaxis Læselii*, *Tragus racemosus*, and *Sclerochloa dura*.

From Sion diverge the paths through the Val d’Hérens and the Val d’Hérémence, described in § 19, and those leading to the Sanetsch and Rawyl passes included in § 23.

The road from Sion to Sierre is less monotonous than in the lower part of the valley. On the sunny slopes of the N. side much wine of local repute is produced. The flat part of the bed is in great part covered with sand and gravel by the frequent inundations of the Rhone.

Sierre (Germ. *Siders*), (Inn: Soleil, good and reasonable), has an air of cleanliness and prosperity not usual in the towns of the Valais. Here is the

division between the German-speaking population of the Upper Valais and those using the French dialect of the lower part of the Canton. Just beyond the town the new road to the Baths of Leuk (§ 23) turns off to the l., and the main road crosses to the l. bank of the Rhone, opposite the opening of the beautiful Val d’Anniviers (§ 19). The hills, formed of gravel and transported blocks, which occupy a great part of the bed of the valley, are apparently the remains of moraines left during the gradual withdrawal of the great glacier that once occupied the valley. After passing *Pfyn* (ad fines?), where the remains of an extensive forest mark a spot where the Valaisans gallantly resisted the French invasion in 1798, the road reaches *Susten* (with a small inn), opposite the picturesque little town of *Leuk*. This stands at the opening of the gorge of the Dala, descending from the Baths of Leuk and the Pass of the Gemmi (§ 23). Few travellers care to walk along the valley of the Rhone: those who do so should follow the country road along the rt. bank from Sierre to Leuk, and may then cross the bridge connecting it with Susten. Here is the opening of a short glen, through which lies a very interesting way by the Ill See to St. Luc (§ 19, Rte. I).

About 3 m. farther is *Turtman* (Fr. *Tourtemagne*) (Inns: Poste, good and reasonable; Soleil, fair), at the opening of the Turtman Thal, 2,208 ft. above the sea. The torrent issuing from the valley makes a fine waterfall, which is but 10 or 15 mins.’ walk from the inn, and deserves a visit. On the rt. bank of the Rhone, about 2 m. from Turtman, is *Gampel*, at the junction of the considerable stream from the Lötschen Thal (§ 25), and a little farther on, near *Raron*, on the same side of the valley, the opening of the *Bietschthal* gives a glimpse of the fine peak of the Bietschhorn (12,969’). After traversing a swampy tract the road reaches

Visp (Fr. *Viège*), (Inns: Soleil, best and reasonable; Poste, tolerable), a village (2,362’) which has grown into

some importance from the extensive tourist-traffic to and from Zermatt. Three good guides, by name Moritz Andermatten, Alexander Albrecht, and Theodor Fuchs, all of them well acquainted with the Monte Rosa district, live at Visp. In hot weather, especially in autumn, it is well to avoid sleeping here, as the place is said to be subject to malaria. The fine snow-pyramid seen to the S., and sometimes pointed out as Monte Rosa (!) is the *Balferin*, the N. peak of the Saas Grat (§ 20, Rte. P). Visp was formerly the residence of most of the native aristocracy of the Upper Valais, but owing to the division of property and changes in the political institutions, most of the old families have dwindled into insignificance. Two churches of rather curious architecture recall the former condition of the country. One of these, originally reserved exclusively for persons of noble family, was partially destroyed by the earthquake of 1855, which injured all the buildings in the town. On the N. side of the Rhone, opposite Visp, is the opening of the *Baltschieder Thal*, an Alpine glen descending from the range of the Nesthorn, and said to produce many rare minerals.

About $3\frac{1}{2}$ m. beyond Visp is *Gamsen*, marked from a distance by the masses of gravel borne down by the *Gamsa* torrent, which here issues from the *Nanzer Thal*, also called *Gamsen Thal*. [This valley has not yet attracted the attention of Alpine travellers. It terminates in the *Gamsa Glacier*, lying on the N. side of the *Rosshodenhorn* (Rte C). About 6 m. S. of Gamsen a path mounts to the E. and reaches the Hospice of the Simplon by the *Bistenen Pass*, respecting which information is desired. This is the most direct, though probably not the shortest course from Visp to Domo d'Ossola. It would doubtless be possible to reach Saas from the Nanzer Thal, passing on either side of the *Simmelihorn*, or over the summit of that peak, which, being 10,730 ft. in height, must command a very fine view.] A mile beyond Gamsen is *Glys*, where the

ascent of the Simplon originally commenced, but the universal practice is to make a slight detour by

Brieg (Inns: Poste, good; H. d'Angleterre; and one or two second-rate houses), a small, cheerful-looking town, with a conspicuous building, the château of the Stockalper family, and another large house which, up to 1847, was a college directed by the Jesuits. There is a pretty good restaurant adjoining the diligence office, convenient for those who travel that way. Pedestrians may save 5 or 6 m. in the ascent by following the old mule-track instead of the road; but in 1839 this was partly carried away, and unless it has been repaired a traveller without a guide may easily miss the way. The writer found $11\frac{1}{2}$ hrs.' steady walking, with a knapsack, sufficient for the distance from Brieg to Domo d'Ossola, not counting a short halt at the Hospice. The old track keeps above the rt. bank of the *Saltine*, leaving Berisal several miles distant to the l.

The Pass of the *Simplon* is the lowest in the main range of the Alps between the Mont Genève and the neighbouring passes leading from Dauphiné into Piedmont, and the Maloya Pass connecting the head of the Lake of Como with the Valley of the Inn. Like those passes, this corresponds rather to a dislocation than to a gap in the main chain. The N. and S. direction prevailing amongst the ridges and valleys of the Monte Rosa group here ceases, and on the opposite side of the Simplon Pass the main range resumes its characteristic direction from SW. to NE. The pass is approached on the N. side through a short and steep glen traversed by the insignificant torrent of the *Saltine*, but on the Italian side the road descends into the narrow ravine of the Val Vedro, running from W. to E. parallel to the adjoining valleys of Bugnanco and Antrona. In ascending from Brieg there is a very fine view of the Bernese Alps to the N., but the great Aletsch Glacier, comparatively near at

hand, is shut out by the slopes of the Aeggischhorn. After mounting some distance by short zigzags, the road makes a wide sweep to the l., and then returns towards the gorge of the Saltine, but at a great height above the torrent. At the Second Refuge the first great obstacle to the progress of the road is encountered. A torrent called the *Ganther* descends from the E. to join the Saltine, and has cut for itself a deep and narrow glen crossing the line that must be taken to reach the pass. The road here makes a second and still longer detour towards the head of the glen of the Ganther, where it passes the inn and post station of *Berisal*. Beds and tolerable food may be had here in case of need. It is now necessary to return, though at a higher level, on the S. side of the Ganther, again approaching the gorge of the Saltine, so that the Fourth Refuge, scarcely 1 m. in a straight line from the second, is distant at least 6 m. by the road. The first tunnel, or gallery, is that of *Schallbet*, and beyond it, to the l., opens a view of a wild gorge bearing the same name, round which the road is carried, though by a less considerable circuit than that of *Berisal*. This part of the road is much exposed to avalanches in winter and spring. Passing under the small *Kaltwasser Glacier*, lying on the W. slope of the Monte Leone, the road is protected from the torrent and from avalanches by an artificial gallery, built in massive masonry, which allows the road to pass unharmed under ice, snow, or waterfall. Here the Monte Leone (11,696'), and the Schönhorn (10,507') rise grandly to the E. and SE., and in approaching the summit of the pass the traveller once again beholds the range of the Bernese Alps as far as the Jungfrau, with the nearly equally lofty chain of the Nesthorn (§ 25), whose peaks are confounded with the more distant mountains behind. Before reaching the Sixth Refuge the road passes through a long new gallery, completed in 1852, erected

to guard this part of the road from spring avalanches. Immediately beyond the same Refuge is the summit of the pass, 6,628 ft. above the sea, marked by a wooden cross. The road descends very gently for $\frac{1}{2}$ m. from the summit to the New Hospice, left unfinished by Napoleon, and only completed many years later by the monks of the Great St. Bernard, to whose care he committed it. The management is similar to that of the parent house (§ 18, Rte. A), but the cold here is much less severe, and the facility of access by the high-road makes the services of the worthy monks less indispensable than at their original station. It is estimated, however, that they annually give gratuitous food or lodging to about 12,000 poor travellers. Those who halt here, and can afford to do so, should, of course, not omit to put a suitable donation into the box kept for that purpose. The chief object which can induce a mountaineer to make this his resting-place is the ascent of the Monte Leone (11,696'), an expedition seldom made, though the view must be remarkably fine. For the pass hence to Saas see Rte. C.

For at least 3 m. from the summit of the pass the road traverses a nearly level plateau, sloping gently to the SE. On the rt. hand stands the Old Hospice, a tower built by one of the Stockalper family. The Seventh Refuge is now in ruins, not being required, and about 3 m. farther is *Simpeln* (Fr. *Simplon*; Ital. *Sempione*). The road and the pass deservedly obtain the French name which is associated with their history, but as the village has a German population, and (although on the Italian side of the watershed) belongs to the Canton Valais, it must retain its original name. Complaints were formerly made of the innkeeper of the Poste here, who was said to resort to ingenious devices to force travellers to halt at his hotel. There is a new inn (*Hôtel Fletschhorn*) at the lower end of the village, said to be well kept and reasonable. The

Rosshoden Glacier, descending from the N. peak of the Fletschhorn, approaches near to the village; the more considerable *Laquin Glacier* sends its torrent down to the valley near to Alaby.

The stream which descends from the upper part of the pass on the side of Italy is called *Krummbach*, but lower down it receives the Italian name *Doveria*. The pedestrian may make a short cut in descending from Simplon to *Alaby*, where the road is carried through a tunnel 224 ft. long, and soon after crosses to the l. bank of the *Doveria*. Here the traveller enters the *Gorge of Gondo*, one of the most remarkable scenes traversed by a carriage-road in the Alps. The valley is here a mere cleft between precipitous gneiss rocks of great height, and the utmost skill of the engineer has been taxed to find a passage for the road alongside of the stream, which, after every storm, becomes a furious torrent. Nor is this the only risk to be encountered. The same cause sometimes detaches blocks of stone from the face or summit of the precipice, and passing carriages have ere now been crushed by their fall. After crossing the *Doveria* by a wooden bridge called *Ponte Alto*, and soon after returning to the l. bank, the road reaches the entrance of the great Gallery of Gondo. This is a tunnel 709 ft. in length, cut through a buttress of extremely hard rock, which all but closes the gorge. Nothing can be more striking than the scene on issuing from the E. end of the tunnel. The *Fressinone* torrent, issuing from a lateral cleft in the wall of the valley, falls in a roaring waterfall close to the mouth of the tunnel, and the road is carried across a bridge close under the fall. The next portion of the road has scarcely yet recovered from the destructive effects of storms which, in 1834 and 1839, carried away bridges and large portions of the roadway.

Gondo (*Germ.* Gunz), with several unattractive inns, and a picturesque Stockalper tower, seven stories high, originally built as a refuge for travel-

lers, is the last village belonging to the Valais. A narrow cleft to the rt. is the opening of the valley of *Zwischbergen* (*Rte. D*). Half a mile beyond the village a column marks the frontier of Italy. This happens to correspond to a considerable change in the character of the vegetation, which assumes a decided southern character when, 2 m. farther, the traveller reaches

Isella (*Inn* : Poste, good and clean, the best on the road between Brieg and Domo), the Italian custom-house station. The storms above alluded to produced their utmost effect in the portion of the valley below *Isella*, called *Val di Vedro*, and for a space of several miles not only did the bridges disappear, but the road itself was completely swept away by the flood. About $1\frac{1}{2}$ m. farther the *Cherasca* torrent joins the *Doveria*. [For the passes leading to the *Binnen Thal* and the *Val Antigorio*, see § 30.] The chestnut has become the prevailing tree before the road passes through the last gallery, where the change of climate is significantly expressed by the prickly pears that have spread over the rocks. A short distance farther the *Doveria* is crossed for the last time by the fine bridge of *Crevola*, and the traveller issues from the narrow gorge of the *Val di Vedro* into the broad stately *Val d'Ossola*, bright with numerous villages and white *campaniles*, rich with the peculiar vegetation of Northern Italy, where mulberry-trees and trellised vines dispute the occupation of the soil with maize and hemp, and the varied crops that are crowded together in every spare spot of ground. The sense of an utter change of scene is completed to the ear by the keen shrillness of the unseen *cicale* that fills the entire air. The *Val d'Ossola* is traversed by the *Tosa* or *Toccia*, a very considerable Alpine stream, which soon ends its short course from the *Val Formazza* (§ 30) in the *Lago Maggiore*. The torrent from the *Val Bugnanco* (*Rte. E*) has poured a vast mass of *débris* into the

broad level bed of the Val d'Ossola a short distance above

Domo d'Ossola (Inns : H. de la Ville, tolerably good ; H. d'Espagne), a small town with nothing worthy of notice, unless it be the Italian aspect of the buildings and the inhabitants. The Hôtel Albasini, just outside the town, is said to be extremely well kept, and the charges reasonable. It is resorted to for the sake of (mineral ?) baths, by persons who lodge *en pension* during the summer season: An omnibus plies daily to Pallanza. A more agreeable way for the pedestrian to the Lago Maggiore lies through the Val Vegezzo (§ 31), but the main road to Arona is carried through a beautiful country, though too hot to make walking pleasant. The charge for a char to Baveno or Pallanza is, or was, 15 fr. After a delay of 20 years the two bridges over the Tosa, on the way to Gravellona, which had been carried away by floods, have lately been rebuilt.

At Villa, about $3\frac{1}{2}$ m. below Domo, the Ovesca, issuing from the Val Antrona, joins the main stream, and the more important stream of the Anza is received into the Tosa a few miles lower down, close to the new bridge at *Masone*. Travellers bound from Domo to the Val Anzasca (§ 20, Rte. F) find a road to the l., leading to Piè di Mulera, some distance before reaching the opening of the valley. About a mile beyond the bridge of Masone is

Vogogna (Inn : Corona, fair). The Tosa is here navigable for large barges. The valley gradually widens as it approaches the lake. At Migliandone the road returns to the rt. bank, leaving the Tosa to make its way to the Lago Maggiore by winding round the base of the Monte Orfano, an isolated mass of very beautiful pink granite, which recurs at Fariolo and some other points in this district. The next post-station is

Ornavasso (Inn : Croce Bianca), where extensive quarries have supplied most of the white marble used in constructing the cathedral of Milan. About 3 m. farther is *Gravellona* (Inn : Eu-

ropa), where the high-road crosses the Strona, which here bears down the drainage of the Lake of Orta (Rte. B). A road to the l. leads to Pallanza, and the traveller gets a first glimpse of the Lago Maggiore. At *Fariolo* (Inn : Leone d'Oro, fair) the bay, extending westward between Pallanza and Stresa, one of the most beautiful portions of the lake, comes fully into view ; and a little farther on the road reaches one of the most frequented haunts of tourists,

Baveno (Inns : Bellevue, new, handsomely fitted up, and well kept ; Poste, improved: both belong to the same proprietor. Travellers are advised to fix beforehand the prices of rooms, meals, &c.). The view of the lake from Baveno is fine, though not superior to that from many other points on its shores. The main source of attraction here is the neighbourhood of the *Borromean Islands*, which have acquired a reputation even greater than their deserts. They may, however, be equally well visited from Stresa, or even from Pallanza (§ 31). The islands are four in number. Of these, the smallest — *Isola di S. Giovanni* — is unimportant, and the *Isola dei Pescatori*, nearest to Baveno, though picturesque from a distance, does not gain by a nearer acquaintance. The *Isola Madre*, halfway between Baveno and Pallanza, is a garden partly planted with orange and lemon trees on formal terraces, and in part laid out in the English style. It is interesting from the variety of exotic plants that here flourish in the open air, though partially protected in winter. The agave attains a great size, and many Australian and Indian trees and shrubs seem to grow freely in sheltered spots. Fee to the gardener, 1 fr.

The chief resort of strangers is the *Isola Bella*. The palace of the Borromeo family, commenced on a scale of regal grandeur, remains incomplete. The state rooms are exhibited to strangers, but there is not much worthy of notice, and the pictures are, almost without exception, of the later Lombard school. The collection includes 50

landscapes by Tempesta, who here found hospitality and a secure retreat when pursued by the ministers of the law for the murder of his wife. The greater part of the island, originally bare rock, was about 2 centuries ago converted into a garden formed of 10 terraces, rising one above the other in successive stages to a height of about 130 ft. above the lake. At an enormous expense of labour and money, soil was carried from the shores of the lake, and arrangements contrived, not only for protecting many of the plants in winter, but for applying artificial heat through subterranean passages. The result has been so far successful, that many plants and trees, not seen elsewhere so far north, here grow luxuriantly, and the effect of the rich vegetation, combined with the beautiful views of the lake and the surrounding mountains, must satisfy all but the most fastidious. Critics who complain of the want of simplicity and naturalness may fairly be answered that the island looks to be what it is—a creation of art—and that on no other terms would it be possible, in such a position, to obtain the object in view. There is a good inn (Delfino) on the island, close to the palace. It is convenient for those going and returning by steamer, but is too small for the number of visitors, and often full.

The charges for boats at Baveno are exorbitant. Going to Isola Bella and returning, 5 fr.; for a short row, or going to the steamer, 2.50 fr.; steamboat passengers to or from the Delfino Hotel pass free of charge.

About 2 m. S. of Baveno is *Stresa*, where there is an inn (Albergo Reale), said to be comfortable and reasonable. A new and larger inn was building here, 1862. Along this part of the lake *Struthiopteris germanica* is not uncommon. For the excursion to the Monte Motterone see next Rte. The next village is *Belgirate* (Inn: Alb. del Porto Franco). From this place to Arona the shore of the lake is thickly studded with villas. Near the next village, *Lesà*, is that of the poet Manzoni.

Farther on is *Meina*, and 3 m. beyond it

Arona (Inns: Italia; Posta; both tolerably good and not cheap), a thriving town, the present terminus of the rly. to Novara, and the chief port for the lake steamers. These ply each way three times daily in summer, and most travellers arriving from Domo d'Ossola at Baveno, Stresa, or Pallanza, prefer to continue their route by steamer. In approaching the town the traveller has passed below the colossal statue of San Carlo Borromeo, standing on a flat-topped hill, which forms a natural terrace parallel to the shore of the lake, $\frac{1}{2}$ hr.'s walk from Arona. The pedestal is 46 ft. high, and the statue 66 ft.; in all, 112 ft. Some zealous sight-seers climb up into the head of the statue, partly by ladders and partly inside the figure, and, after sitting down in the inside of the nose, scramble down again.

From Arona 4 trains go daily to Alessandria, and after a short delay passengers may proceed thence to Genoa. At Novara these trains meet the line from Turin to Milan, belonging to another company. As railway managers never scruple to sacrifice their own interest when they hope thereby to damage a rival line, the passengers by all the trains to Milan, and most of those to Turin, are forced to wait 2 or 3 hrs. at the Novara station. The practical effect is to shut out the wealthy inhabitants of Milan from resorting to the shores of the Lago Maggiore.

The Lago Maggiore is described in § 31.

A glance at the map shows that, irrespective of the windings of the roadway necessary to surmount the steep slopes, the road of the Simplon makes a great detour round the W. and S. sides of the Monte Leone, whereas the direct way from Brieg to Domo would lie by the NE. side of that peak and along the Val Cherasca, which joins the Val Vedro below Isella. The *Passo di Forchetta* appears to be a direct way from Berisal to the head of the Val Cherasca. If not very difficult, it is probably well known

to the smugglers of that valley; but it does not appear to have attracted the attention of Alpine travellers.

ROUTE B.

DOMO D'OSSOLA TO ARONA, BY ORTA.

The Lake of Orta, described in § 20, Rte. K, is closely connected with the road of the Simplon, and may conveniently be taken in the way to Arona, either by the carriage-traveller or the pedestrian. From Gravelлона (Rte. A), nearly 20 m. from Domo, a good road runs along the l. bank of the Strona to *Omegna* (§ 20, Rte. M), a distance of 5 m. Thence to Orta is an agreeable drive along the lake of about $6\frac{1}{2}$ m., or a rather less distance by boat; charge, with one rower, 2 fr. From Orta to Arona it was formerly necessary to make a long detour by Borgomanero, but a new carriage-road has been completed, hilly but commanding fine views. By this way the distance from Gravelлона to Arona is not more than 24 m.

A far more interesting way, enabling the traveller to enjoy the finest parts of both routes to Arona, with the addition of a first-rate view, is by the *Monte Motterone*, or *Mte. Margozzolo*, the summit of the range dividing the two lakes. It may be easily reached from Orta, Omegna, Baveno, or Stresa, and no one stopping at any of those places should omit the ascent. The mountain has been called the Italian Righi, a title which better belongs to the Monte Generoso (§ 39). The panorama is, indeed, very beautiful, and not unworthy to rank near to its Swiss rival; but the mountain is in itself far less interesting, the relief of the surface is less varied, the brilliant colouring of the Alpine pastures is not seen here, and a great part of the surface is occupied by meagre stunted heather, wherein shades grey and brown

predominate. The traveller wishing to enjoy the view, and to visit both the lakes, will do best to turn aside from the Simplon road at Gravelлона and sleep at Orta (§ 20, Rte. K). Thence the Motterone is easily reached in $3\frac{1}{2}$ hrs., passing the hamlets of Masino and Chègino. Those who avail themselves of donkeys, which are kept for the ascent, may allow $\frac{1}{2}$ hr. longer time. It is advisable to start very early, and so increase the chance of a clear view; but should clouds come on, and there be no chance of perseverance being rewarded, on reaching a sign-post with the inscription, '*Alla Cima del Motterone*,' the traveller instead of following the track to the summit may keep straight on over the shoulder of the mountain, and so save $1\frac{1}{2}$ hr. in his morning's walk.

In one respect the panorama from the summit (4,817') is superior to that from the Righi, as the peaks of Monte Rosa and the Saas Grat are here nearer at hand, and better seen than the Bernese Oberland range is from the Swiss mountain. These mighty summits are followed by the Weissmies and the Monte Leone, succeeded by a crowd of lower summits chiefly belonging to the Canton of Tessin. Between NE. and E. the more distant range of the Bernina shows its snowy peaks, and still farther off a glacier-clad mass is distinguished which is often pointed out as the Orteler Spitze, and sometimes as the Oetzthaler Alps. This is the range of the Adamello, between the Val Camonica and the Val Rendena (§ 41), about 100 m. distant from the observer. The vast plain of Lombardy and Piedmont is in clear weather bounded by the Apennine, and towards the W. by the Cottian Alps, crowned by the peak of Monte Viso. The characteristic beauty of the view depends, however, on the two lakes which, between them, all but surround the mountain, and one advantage of making the ascent from Orta is in the additional charm of this first view of the Lago Maggiore, which remains in sight

during the greater part of the descent. The lakes of Varese, Comabbio, Bian drone, and Monate, though not prominent, are interesting objects in the panorama. The descent to Baveno is shorter and steeper than that to Stresa, but either may be easily reached in $2\frac{1}{2}$ hrs. In fine weather a person well used to mountain walking will not absolutely require a guide, but when the clouds lie low it is extremely difficult for a stranger to find his way over the undulating ridges of the mountain. Charge for a guide, 5 fr.

ROUTE C.

SAAS TO THE SIMPLON HOSPICE — ASCENT OF THE FLETSCHHORN.

The lofty chain lying between the valley of Saas and the road of the Simplon is far from being completely explored, though better known than formerly, owing to the successful expeditions referred to in this and the following Rtes.

The highest summit in the range is the *Weissmies* (13,225'), immediately E. of Saas. N. of the *Weissmies*, and but a few feet lower, is the *Fletschhorn*, which when seen from the Bernese Alps, or the Italian valleys, shows as a single peak, but in fact includes two summits separated by a deep and impassable interval of rock and glacier. The higher of these, properly called *Laquinhorn* (13,176'), was first ascended in 1856 by Mr. Ames and three English companions, with Herr Imseng, late *curé* of Saas, and four guides. An account of the expedition is given in the first series of 'Peaks, Passes, and Glaciers.' The other peak, standing a little N. of the last, is the *Rossbodenhorn* (13,084'). This was attained several years ago by a Swiss traveller, who started from the Hospice of the Simplon, and reached the summit by way of the *Rossboden Glacier*.

In regard to passes over this part

of the range, scarce any information has come to hand. It is certain that a way has once or twice been found across the glaciers on the N. side of the *Rossbodenhorn* by which the village of *Simpeln* has been reached from *Saas*. The writer obtained some information on the subject at the *Simplon Hospice* in 1840, from the then *Prior*, but the lateness of the season and a heavy fall of fresh snow prevented his attempting the pass. He believes that the ascent was made on the *Saas* side, from near the hamlet of *Balen*, by the *Fletschhorn Glacier*, and the descent on the *Simplon* side by the *Rossboden Glacier*, which is said to be much crevassed. It does not appear that any attempt has been made to pass direct from *Saas* to *Simpeln* by the *Trift Glacier* and the ridge connecting the *Weissmies* and the *Laquinhorn*. If practicable this would be a first-rate pass, and the attempt may be recommended to adventurous mountaineers. The ascent of the *Laquinhorn*, as described by Mr. Ames, appears to be free from serious difficulty. A broken ridge of rock descending from the summit towards the valley of *Saas* divides two small glaciers which unite at its base some way above the *Trift Alp*. Crossing the glacier to the foot of the ridge the summit is reached by steady climbing for about $3\frac{1}{2}$ hrs. The view is, of course, very grand, but, perhaps, not quite equal to that from the *Weissmies* (Rte. D).

ROUTE D.

SAAS TO ISELLA, BY THE ZWISCHBERGEN PASS — ASCENT OF THE WEISSMIES.

On the S. side of the *Weissmies*, and between that mountain and the rugged range of the *Portien Grat*, is a depression in the main chain, giving a passage from *Saas* into *Piedmont*

through the narrow valley of Zwischbergen, which joins the Val Vedro just above the village of Gondo. Though high and rather long, requiring 11 hrs. from Saas to Isella, this pass is free from difficulty, so that for a practised mountaineer, and in fine weather, a guide is not indispensable. As mentioned in § 20, Rte. N, the *Lehmbach* torrent joins the Visp at *Almagell*, less than 1 hr. above Saas. Following the stream, the pass is clearly seen throughout the greater part of the ascent, which lies over grassy slopes. Towards the top are considerable patches of snow, and in $4\frac{1}{2}$ hrs. from Saas the traveller reaches the summit of the *Zwischbergen Pass* (10,742'). 'The view is superb, that to the N. alone being concealed by the intervening mass of the Weissmies. It comprises the most perfect view that I have seen of the chain of the Saas Grat, extending to Monte Rosa, a large section of the Lago Maggiore, and endless ranges of mountains eastward, far away into the Tyrol.'—[A. M.] 'The ridge of the pass is very sharp, and falls steeply on the NE. side to a glacier. This is easily reached, however, by some snow-slopes on its N. bank. Following this, until it is possible to take to the moraine near the foot of the glacier, on gaining the highest pastures a track will be found.'—[L. S.] The descent through the Zwischbergen valley is long, but it lies through fine scenery. At the village of *Zwischbergen* gold was formerly obtained, by washing the sand and gravel brought down by the torrent, and it is said that particles are often seen, though the quantity is trifling. In $6\frac{1}{2}$ hrs.' steady walking from the pass the traveller may reach Isella (Rte. A).

The first ascent of the Weissmies is said to have been made by a Swiss traveller. The summit was reached in 1859 by the Rev. Leslie Stephen and Mr. Hinchliff. It appears for its height (13,225') to be easy of access, and admirably situated for a panoramic view.

'The ascent begins directly behind Saas, and leads over grass up to near a point marked Trifthorn by Studer. Here it is necessary to leave the ridge and keep along the rocks on the cliffs facing the S. They are remarkably sound and firm rocks. The ridge is again struck at the point where it becomes capped with snow, and along this snowy ridge it is easy to reach the summit. A good many steps might occasionally have to be cut. The ascent requires about 8 hrs., and the descent, being shortened by glissades, 4 hrs.'—[L. S.]

ROUTE E.

SAAS TO DOMO D'OSSOLA, BY THE VAL BUGNANCO.

This Rte. is merely indicated here in default of information, with a view to point out a way which may be both convenient and interesting, and which certainly deserves to be explored. The *Val Bugnanco*, descending due E., close to the town of Domo d'Ossola, originates in a range of mountains connected with the Portien Grat, which divides it from the head of the Zwischbergen valley described in the last Rte. According to the Swiss Federal map, it appears that one pass, leading across the above-mentioned range, connects the upper parts of the two valleys, and that another pass, apparently a low one, leads into the upper part of the Val Bugnanco from *Cheggio* in the N. branch of the Val Antrona. It is apparent from the map that if either of these two passes be easy, and do not involve a long ascent, the Val Bugnanco must afford the shortest and most direct way from Saas to Domo d'Ossola; probably the only way that can conveniently be accomplished in a single day's walk.

Of the Val Bugnanco the editor has no information save from the reports of one or two naturalists who have visited it from Domo. Several rare plants, and amongst them the *Valeriana Saliunca*, have been found here.

ROUTE F.

SAAS TO DOMO D'OSSOLA, BY THE VAL ANTRONA.

The *Val Antrona* is a rather considerable valley which joins the Val d'Ossola rather more than 1 hr. below Domo. It is very sinuous, especially at the upper end, where it divides into two branches, which unite at the village of Antrona Piano. At least three passes lead from the Saas Thal into the Val Antrona. Information, however, is very scanty in respect to all of them.

1. The northernmost of these passes, which may be called *Almagell Joch*, as it passes near the *Almagellhorn*, is reached through the glen of the Lehm-bach by the path from Almagell noticed in Rte. D. It crosses the main chain to the S. of the Portien Grat, at the head of the *Rothplatt Glacier*. On the E. side it leads into the upper end of the N. branch of the Val Antrona, which describes a long curve of horse-shoe form before joining the S. branch of the same valley at the village of *Antrona Piano*. From *Cheggio*, which is apparently about 2 m. N. of the last-named village, a track leads to the Val Bugnanco (last Rte.) over the ridge W. of the Monte Cardo, and probably affords the most direct way to Domo d'Ossola.

2. The most frequented way from Saas to the Val Antrona is by the *Furage Thal*, which joins the Saas Thal at Z'meigern, about $\frac{1}{2}$ hr. above

Almagell. This is called the *Saas Pass*, and remains of a paved track show that at one time it must have been a frequented route. The way lies in part over the *Furge Glacier*, but is free from difficulty. N. of the col, and perhaps 1,000 ft. higher, there is a projecting point called *Latelhorn* (Ahnenhorn of Federal map?).

'This commands a most superb view over the entire range of the Alps from Monte Rosa to the Tyrol, with the subordinate ranges of Piedmont, Tessin, and Lombardy. This point is new; it is probably not above 10,000 ft., but easy of access. Horses can go within $1\frac{1}{2}$ hr., or less, of the top; and the remainder of the ascent, except just the horn itself, for some 200 ft., is easy. There are beds of snow, but no ice to cross. By a tolerable walker the excursion from Saas and back may be made in 10 hrs., allowing 1 hr. on the top, and $\frac{1}{2}$ hr. for refreshment.'—[M.]

The descent on the Piedmontese side is very steep, but free from ice. The track follows the sinuous course of the *Ovesca* or *Oyasca* torrent. To the rt., near the head of the valley, a path leads to Vanzone in the Val Anzasca by the *Passo di S. Martino*. The village of Antrona Piano, where the N. branch of the valley joins the main S. branch, is about half-way from the summit of the pass to *Villa*, where the valley opens into the Val d'Ossola. Below the principal village a path leads to Ponte Grande (§ 20, Rte. F) by the *Passo di Lavazzerà* (5,863').

3. A glacier pass, called *Passo Antigine*, lies at the head of the short wild glen of the Ofenthal, which opens due E. a little above the Mattmark See. On the Italian side the way lies NE., until, at the head of the main branch of the Val Antrona, it joins the track from the Saas Pass.

Further information respecting the passes in this and the last-mentioned Rte. is much desired.

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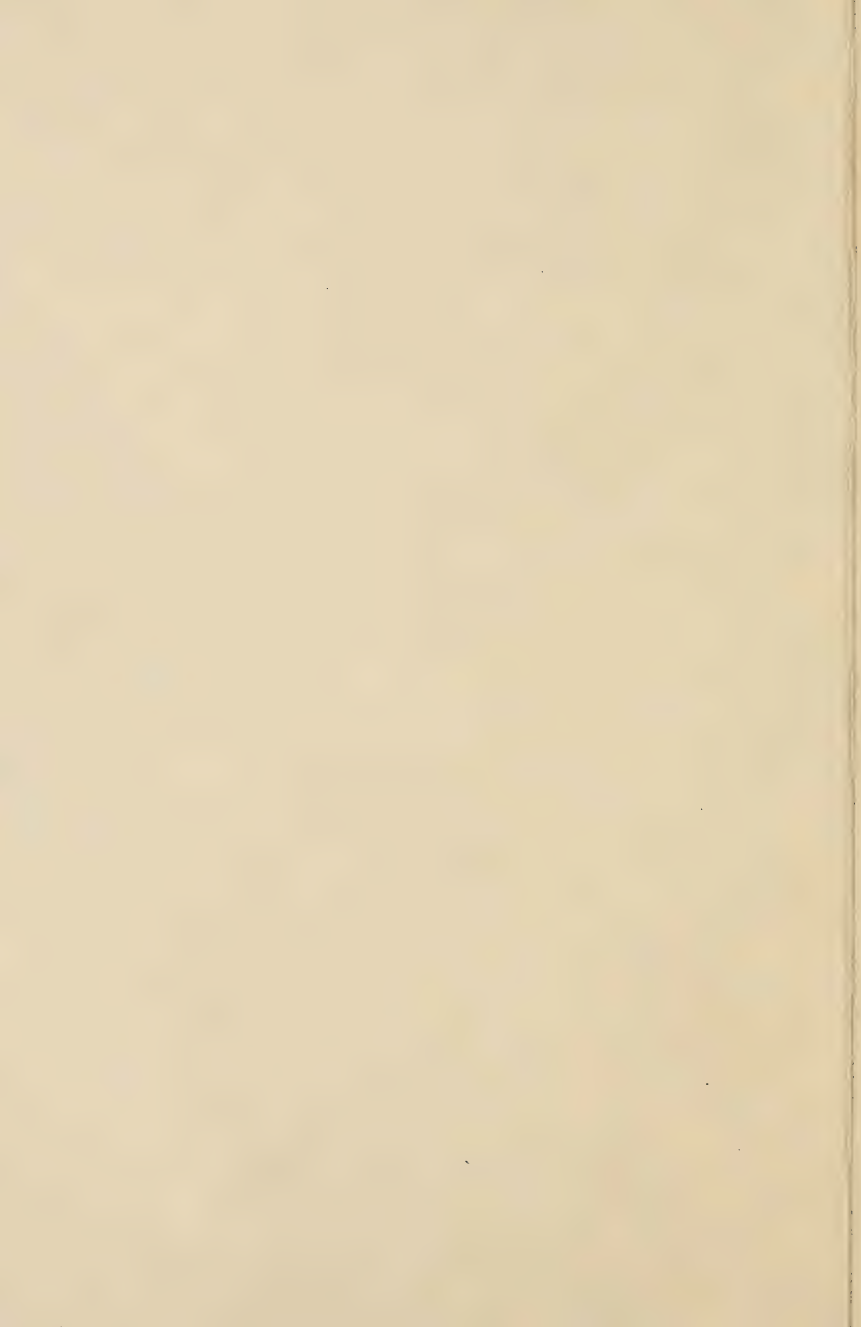
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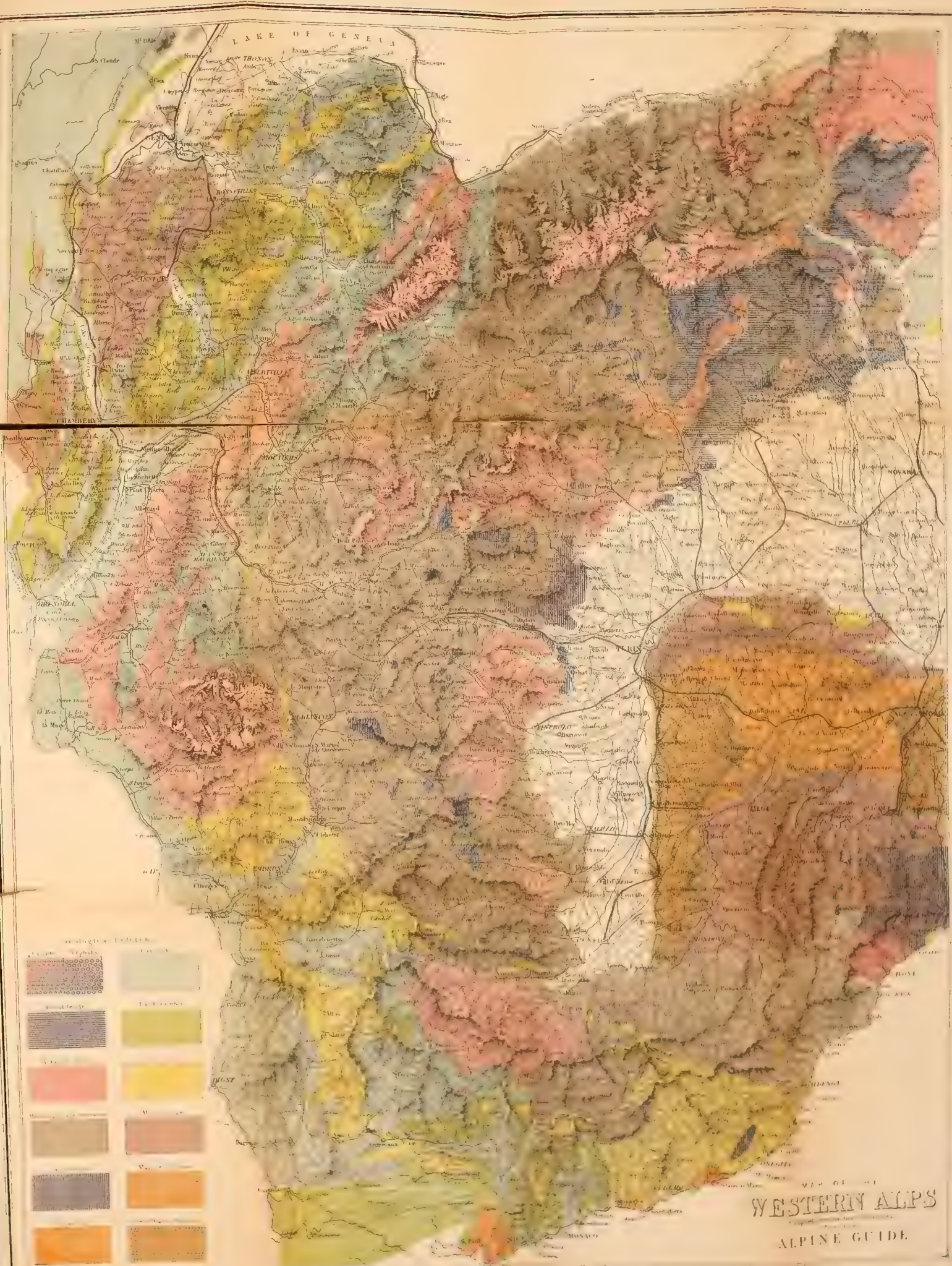
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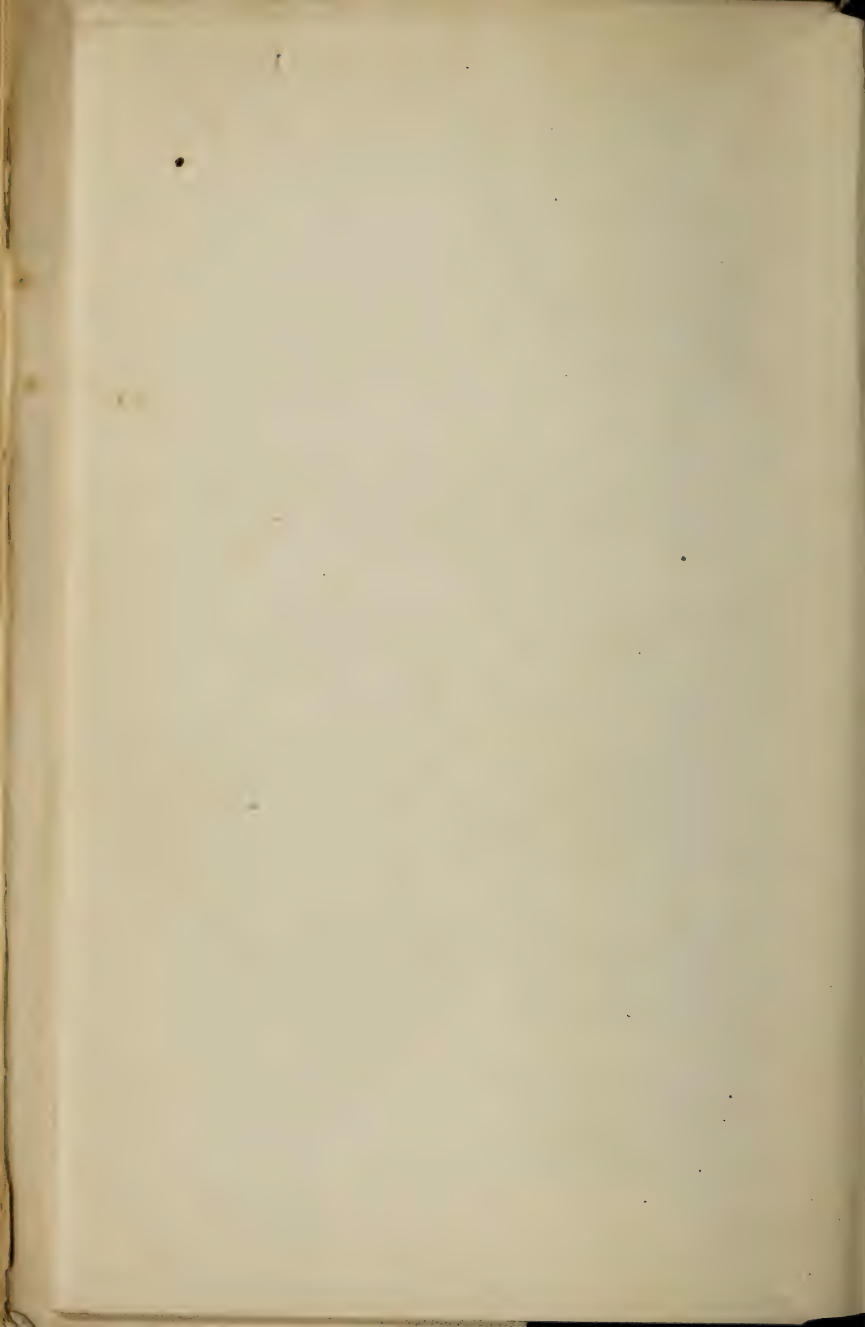
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I strongly advise tourists to follow my example. They will mostly require a rope to enable their guide to assist them up two short terraces of rather slippery rock, in which a stonemason could scoop a set of steps in half a day. An enterprising Swiss might also avail himself of the natural disposition of the strata, and cut a perfectly secure "covered way" within five yards of the ice fall.

FRANCIS GALTON.

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indeed, that scarce a minute passed without proceeding in the same direction as the larger and smaller meteors of the ordinary description, all I observed the same evening that the sky comet of 1858, only much brighter and very seen before. It was shaped something like This trail of light was different from any that passed out of sight. nearly half a minute after the nucleus of and fiery trail of light behind, which remained south-west horizon, where it disappeared, leaving proceeded in an oblique direction downwards was first visible at about 30 deg. elevation seemingly about one-sixth of the diameter of the packet.—HEAD & PATTERSON, 5, Martin's-lane, Eastcheap, London, whose names are affixed United Kingdom are Messrs Tomlin, Rendell, and also give notice, that the sole consignees of Maize of Chanery for an injunction. The Glen Cove breach immediate proceedings will be taken in it, as if infringing their said trade mark, and from using the Glen Cove Company hereby CAUTION all persons word forms an essential part of their trade mark have for some years sold under the title of Maizen the Indian Corn," which preparation the said peculiar preparation of the most nutritious product, of New York, are the only manufacturers and title of Maizena affixed thereto. The Glen Cove and inferior compound, which has been sold with that a person has been manufacturing a

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TO THE EDITOR OF THE TIMES.

Sir,—Every day during the season hundreds of Swiss travellers cross between Lauterbrunnen and Grindelwald, by way of the Wengern Alp, with the object of seeing the vast precipices of the Jungfrau range, and especially of witnessing the avalanches that rush and roar at frequent intervals down its sides. I beg to assure future tourists that the majesty of these avalanches may be safely witnessed by those who are capable of a short scramble at the distance of a few yards, instead of from the Wengern Alp, which stands a mile from their course, and whence they appear of such insignificant proportions as grievously to disappoint the spectators. This morning, in pursuance of an idea which occurred to me last year, I made an excursion to see how near I could get with safety to the channel down which all the avalanches from the north face of the Jungfrau necessarily fall, and I succeeded beyond my expectations. I have witnessed one of the most astounding of Alpine phenomena with perfect ease, and have examined it with a leisure and a nearness which I believe no mountaineer, however practised, can have accomplished in his ordinary expeditions. The channel I went to directly faces the Jungfrau Hotel, on the Wengern Alp, and may be reached from it in an hour and a half. It is the sole outlet of the Jungfrau glacier (that goes here by the name of the Giessen), and conveys its snow waters and its avalanches to the bottom of the deep valley that separates the Jungfrau range from the Wengern Alp. In some seasons ice falls down it half-hourly; in this peculiarly hot and dry month they are much more rare, but in the course of a long half day I witnessed three magnificent ones at ten yards' distance, besides many occasional peltings. The avalanches are detached from the snowfields above, they then slide, tumble, and roll down a steep slope of perhaps 40 deg., through a descent of 2,000 yards, to the head of the channel of which I have been speaking. Thence they dash down it in two great leaps and numerous minor cascades, amounting in the whole to 1,000 feet of descent, and, hurtling together and rattling as they go, they rage and burst forth at the foot of the channel (by which I took my stand) like a storm of shrapnell. The avalanche here mainly consists of a mass of iceballs about one foot in diameter, and which seem never to exceed a yard; a vast quantity of smaller pieces of rounded ice is also projected, and fills the interstices between the larger balls, as the whole slides along a final slope of another 1,000 feet of descent to the bottom of the valley. After they have burst from the channel their course is steady but rapid; they follow the undulations of the slope like a riband. Occasionally one of the larger balls would break loose and roll, and so get the start of its companions; but the general appearance of the moving mass is that of an orderly mob filling a street and hastening, not hurrying, to the same object. The noise they make is peculiar. I often shut my eyes and tried to conceive what I should have guessed it to be had I heard it unexpectedly. It has the "whish," but not the splash, of water from a broken waterpipe, and it rises and falls like the noises of the sea. The best comparison I can make is to the sound of a rapid tide rushing up many channels. Neither in the fearful rattle of the ice cascade, nor in the sound of the slide, could I trace any resemblance to the roar that is always heard at a distance. Precisely as after lightning, where a harsh, rending sound, composed of innumerable electric crepitations is echoed and reverberated at a distance into prolonged thunder, so do similar sounds made by the ice and acted on by similar influences produce the roar of the avalanche.

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FRANCIS GALTON.

Scheideck Hotel, Aug. 3.

A GLACIER ADVENTURE.—We were soon beside a wide and jagged cleft, which resembled a kind of cave. This cleft had been spanned by a snow bridge, now broken, and up to the edge of which human footsteps could be traced. The glacier here was considerably torn, but simple patience was the only thing needed to unravel its complexity. This quality our porter lacked, and, hoping to make shorter work of it, he attempted to cross this bridge. It gave way, and he went down, carrying an immense load of *débris* along with him. We looked into the hole, at one end of which the vision was cut short by darkness, while immediately under the broken arch it was crammed with snow and shattered icicles. We saw nothing more. We listened with strained attention, and from the depths of the glacier a low moan seemed to issue. Its repetition assured us that it was no delusion—the man was still alive. A first-rate rope accompanied the party, but unhappily it was with the man in the crevasse. "Take off coats, waistcoats, and braces." They were instantly taken off and knotted together. We watched B. while this work was going on; his hands trembled with excitement, and his knots were evidently insecure. The last junction complete, he exclaimed, "Now let me down!" "Not until each of these knots have been tested; not an inch!" Two of them gave way, and L.'s waistcoat also proved too tender for the strain. The *débris* was about 40ft from the surface of the glacier, but two prominences afforded a kind of footing. B. was dropped down to one of these; T. followed, being let down by L.; he could not trust the porter overhead. B. then descended the remaining distance, and was duly followed by T. More could not find room. The shape and size of the cavity were such as to produce a kind of resonance, which rendered it difficult to strike the precise spot from which the sound issued. But the moaning continued, becoming to all appearance gradually feebler. Fearing to wound the man, the *débris* was cautiously rooted away; it rang curiously as it fell into the adjacent gloom. A layer, two or three feet thick, was thus removed; and, finally, from the frozen mass, and so bloodless as to be almost as white as the surrounding snow, issued a single hand. The fingers moved. Round it we rooted, and soon reached the knapsack, which we cut away. With it we regained our rope. The man's head was laid bare, and our brandy flask was immediately at his lips. He tried to speak, but was inarticulate, his words jumbling themselves to a dull moan. The arms once free, we passed the rope underneath them, and sought to draw the man out. But the ice fragments round him had regelated so as to form a solid case. Thrice we essayed to draw him up, thrice we failed; he had literally to be hewn out of the ice, and not until his last foot was extricated were we able to lift him. L. and the porter pulling above, and we pushing him below, the man was raised to the light of day. L. then drew his friend out of the pit, and B. followed. For an hour we had been in the crevasse in shirt sleeves—the porter had been in it for two hours—and the dripping ice had drenched us. The rescued man was helpless, unable to stand or to utter an articulate sentence. We got him to the side of the glacier, and here B. took him on his back; in ten minutes he sank under his load. B. carried a miscellaneous burden. It was now our turn with the man, then again B.'s, and thus helping each other, we reached the mountain grid. The sun had set and the crown of the Inca was visible led in amber light. Thinking that the Marañon Stream could be reached before dark, we proposed starting in search of help. The good B. would not hear of it, and L.'s own slightly phlegmatic disposition was against an evening journey on a man's feelings. "Good then you L., and now for the night!" But the very thought of a night's exposure was sufficient to shatter our plans. Thence we found ourselves descending the glacier, and were very fortunate. The snow was deep and soft, and the descent was made without accident. The rescue was successful.

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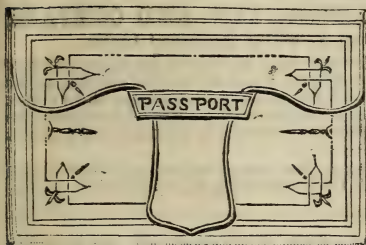
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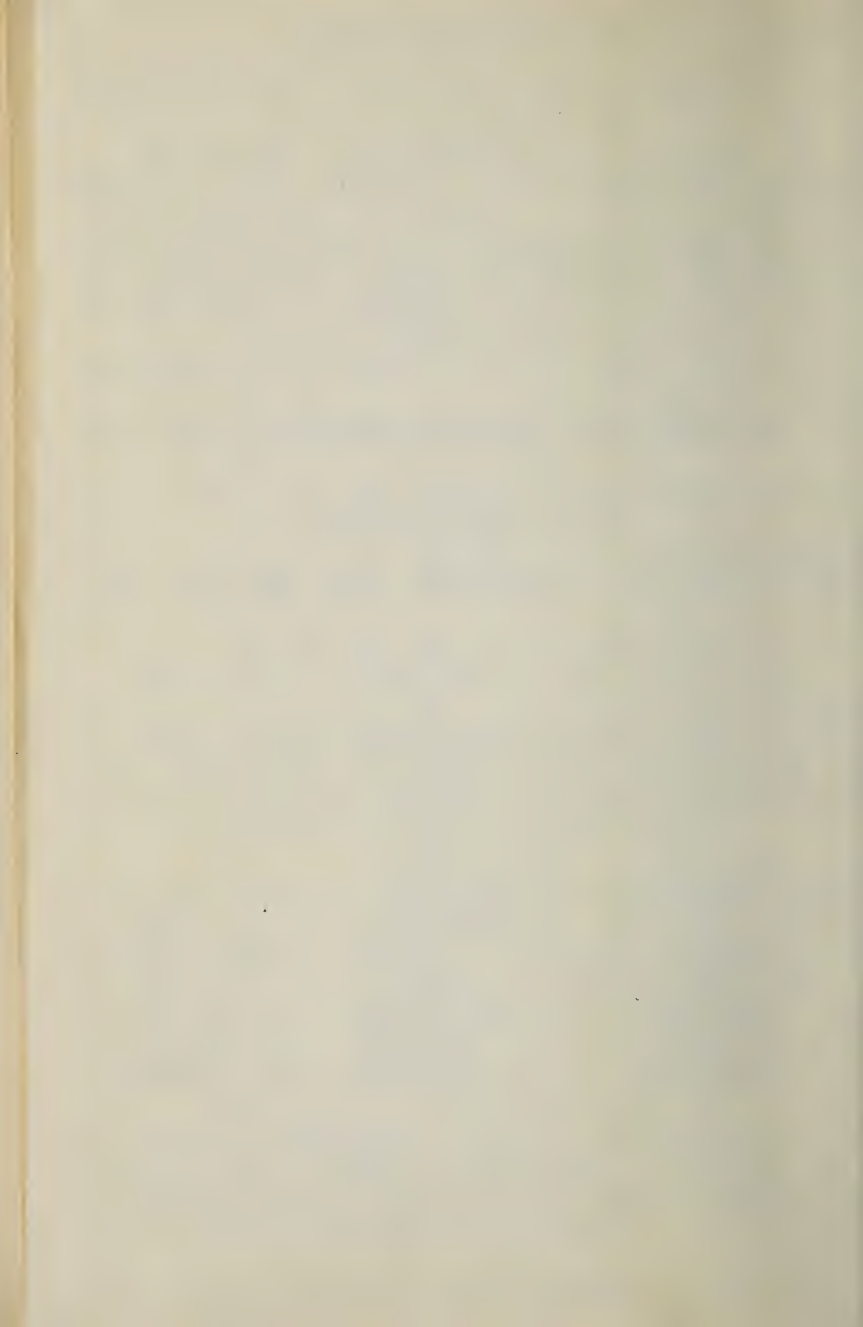
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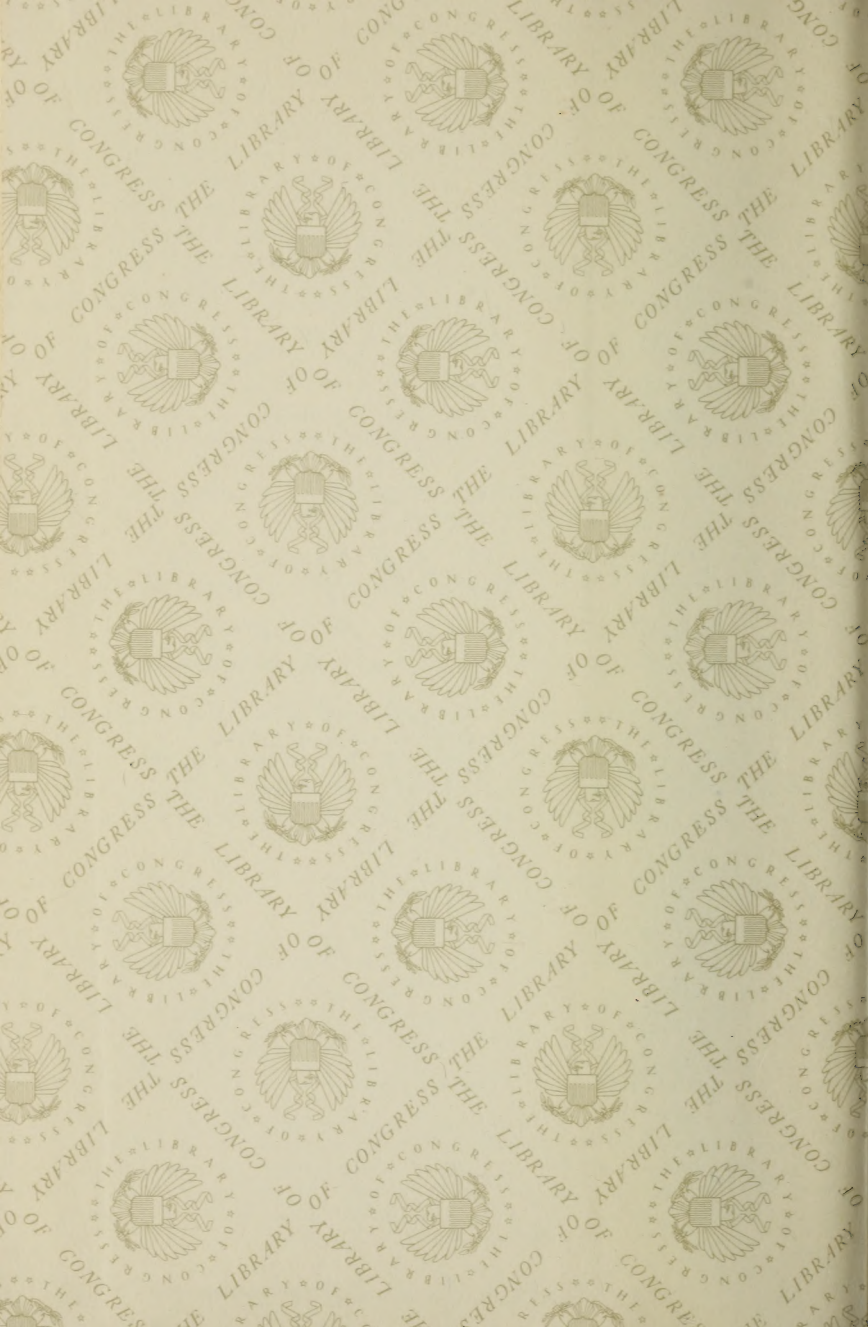
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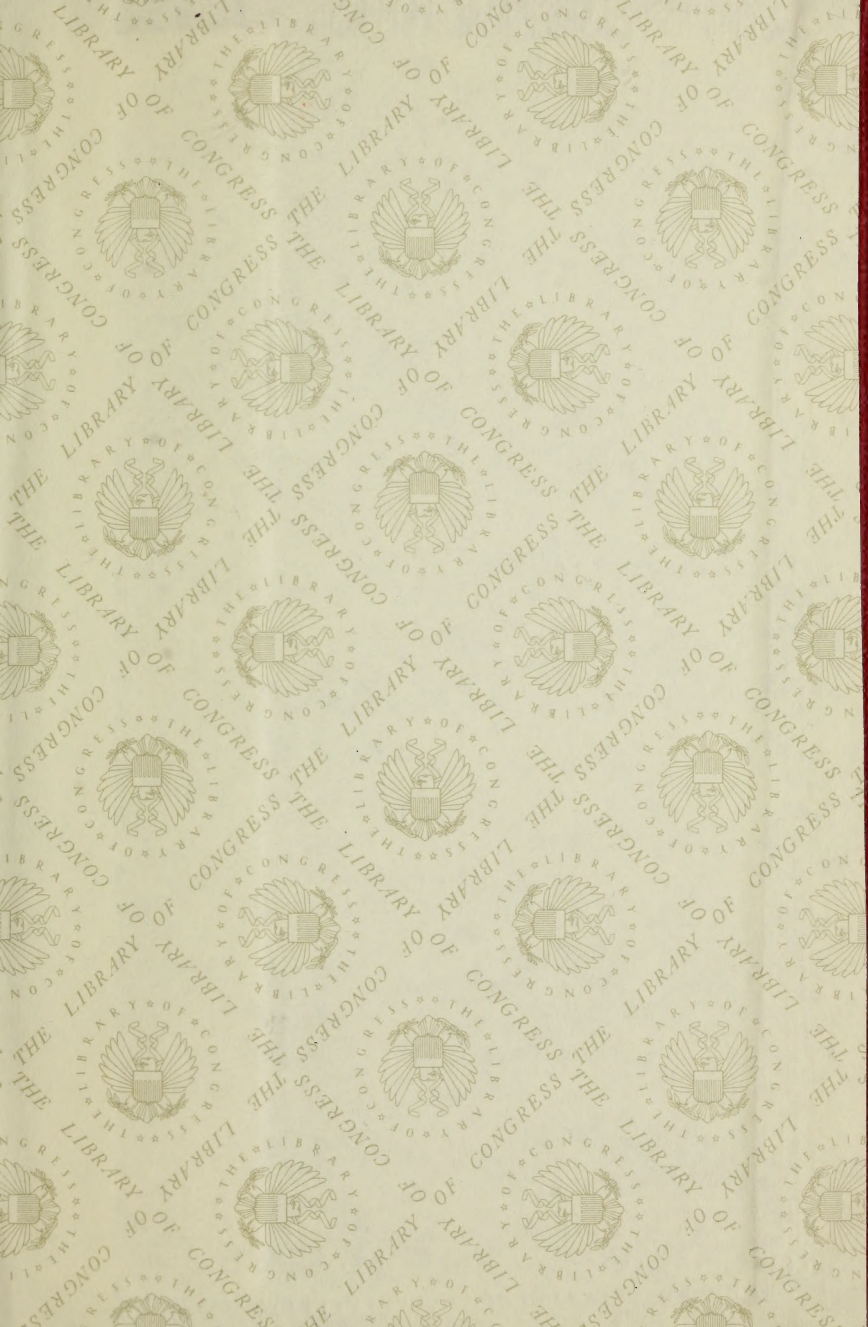
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